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SUPPLY/DEMAND

Occupational Projections
and
Training Data

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Supply - Demand

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I.
Occupational Data

The president of an East Coast firm is considering building a new plant in Arizona but wonders if skilled workers will be available in the area.

A CETA planner reviews the lack of success of a local training program and questions if the facility is training people for occupations in which there is an oversupply of applicants.

A school counselor must advise several students which career choices would offer the best chances of employment.

A job developer is discussing employee recruitment with a personnel manager - both are uncertain exactly what types of workers are available.

Each of these people need more information about labor supply and demand. That is, how many people are trained and working in various occupations; how many are qualified but unemployed and looking for work; and which jobs will be needing new workers in coming years? This information can be used to evaluate the local labor market and formulate solutions to problems - problems of education and training, job placement and recruiting, and business expansion or relocation.

This publication brings together several sources of information concerning the supply as well as the projected demand of workers in Arizona. A national comparison of this data may be found in "Occupational Projections and Training Data" (Bulletin 1918. U.S. Dept. of Labor, 1976). The "Occupational Outlook Handbook" provides a more extensive narrative of jobs on the national scene.

OCCUPATIONAL DEMAND

To meet the needs for local data, the Department of Labor in cooperation with the Arizona Department of Economic Security established the Occupational Employment Statistics (OES) Program. This program conducts mail surveys to collect employment data by occupation and by industry. Data are now available in the "Arizona Occupational Profiles" which list occupational employment within industries at the state and planning district level. Occupational projections, in this booklet, have been derived from OES data based on 1977 employment. Chapter II in this booklet describes the occupational demand in Arizona.

THE LABOR SUPPLY

Data on labor supply are difficult to document since there are several sources of new entrants and reentrants to the labor market (See Chart #1). For each occupation such data include:

1. The number of persons completing training specifically designed to prepare them for work in that occupation.

2. The number of persons completing related training.

3. The number of workers who can be expected to transfer from other occupations.

4. The number of qualified persons not currently in the labor force who can be expected to seek employment in the occupation.

5. Unemployed persons who are qualified to work in the occupation.

6. The number of qualified job seekers moving into the area, a particularly important factor in Arizona.

The ability to determine supply varies among occupations, depending on the requirements of the occupation and the availability of current data. Records of graduates of specific training and educational facilities are the most reliable source. Unemployment insurance records provide additional information. Other common references such as the Census, current population surveys, Job Service statistics (ESARS) or employer surveys provide indicators of labor market trends. Chapter III provides descriptions & statistics of various educational & training programs.

USE OF INFORMATION IN PLANNING

This section illustrates ways that data on occupational projections and training statistics may be used in vocational guidance, and planning education and training programs. To use the data properly, one needs a clear understanding of what the specific projections represent. Estimates of demand or requirements in 1985 represent the number of workers who will be required

the labor supply pool

flows of workers out of and into an occupation

B. ENTRIES

1. Specific training
2. Other training
3. Other occupations
4. Outside the labor force
5. In-migration

A. CURRENT SUPPLY

EMPLOYED & UNEMPLOYED

C. SEPARATIONS

1. Other occupations
2. Outside the labor force, including retirements
3. Deaths
4. Out-migration

to produce the amount of goods and services implied in the Bureau of Labor Statistics' model of the economy for that year (See Appendix A for "Methods & Assumptions for Occupational Projections"). Estimates of annual openings represent estimates of jobs that will open because of growth in the occupation and to replace workers who die, retire, or leave the labor force for other reasons. Workers who transfer from one occupation to another are not included in the estimates of job openings in this bulletin because of the lack of information upon which to base such estimates.

Supply estimates, where they are presented, represent the numbers of workers who completed training in Arizona for a particular occupation. Past trends of entry to the occupation were noted when available. These estimates are developed independently of the demand estimates. Thus, supply and demand in this bulletin are not discussed in the usual economic sense in which wages play a major role in equating supply and demand. Rather, the projections are developed so that planning officials can evaluate what current trends in supply mean for future supply-demand conditions and if needed, action can be taken to avert shortage or surplus situations.

Statistical analysis. Ranking or indexing occupations by employment levels, job openings, growth rates, or other measures can be a useful device for some planning purposes. A planner concerned with developing curricula for vocational education programs, for example, may be concerned with finding occupations that are expected to have many job opportunities. A ranking of occupations by projected annual job openings is a useful statistical tool for this purpose. Extending the rankings to cover additional factors (such as size of employment and projected growth rates in specific occupations) provides information that can be compared to total employment or expected average growth rates for all workers. An advantage of working with ranked data is that they can be presented in graphic form that can be readily understood by those who are not statistically inclined.

An analyst or counselor also may want to rearrange the data to a form better suited to his/her specific purposes. If, for example, an analyst is specifically interested in apprenticable occupations, he or she may note that these occupations fall in the construction crafts, mechanics and repairers, and industrial production groups. Similarly, jobs can be grouped to indicate those for which college or university, junior college, or other types of training are required or helpful. Many tables in this bulletin provide vocational education and higher education codes along with occupational titles to aid individuals in selecting occupations with the desired specifications.

Relating occupational projections to training data. The data on projected annual job openings for specific occupations can be used in conjunction with available training data to provide information for planning and counseling (See Chapter 4). Analysis of the data, however, should be tailored for the specific occupation under consideration. Conclusions drawn from the data depend on factors such as training paths, sources of occupational entry, and the necessity for specific kinds of training. For example, the conclusions derived for an occupation for which 4 years of specialized college training are generally required will be much different than that for an occupation in which vocational training is recommended but not required. For occupations that do not require formal training, still other conclusions will be appropriate.

To use the data in this report therefore, the demand and supply structure of the occupation must be understood. On the supply side, the discussion of occupational requirements in Chapter IV should be considered along with all available statistical data. Consideration must be given to questions such as: is the number of reentrants to the labor force generally large in this occupation? Does armed forces training play a significant role in training workers for this occupation? Do established career patterns and career ladders indicate that large numbers of workers will desire to transfer into the occupation from related fields? Do informal employer training programs provide large numbers of workers in these occupations?

On the demand side, questions should concern the significance of openings caused by workers transferring to other occupations. Many questions can be answered with some assurance and will cause few problems in the analysis. The answers to others are in doubt, and decisions based only on available statistics must be considered carefully.

II.
Arizona Employment
&
Projected Demand

This chapter presents occupational employment in Arizona as well as projections of occupational requirements through 1985 based on extensive research of economic growth, technological change, and industrial and occupational trends. Appendix A furnishes more information on the assumptions underlying these projections. More detail of the economic and industry projections is presented in the December 1978 issue of the "Monthly Labor Review," U.S. Department of Labor.

FACTORS AFFECTING OCCUPATIONAL EMPLOYMENT

Many factors will change employment levels of occupations.

1) Growth rates of industries: The level of growth within an industry will directly affect the growth of occupations concentrated in that industry. In Arizona, for example, mining engineer jobs decline when the mining industry slows down.

2) Changing occupational structure within an industry: Such changes result from a variety of causes. Technological innovations in machines or production processes can cause employment in occupations to expand or contract and create a need for new jobs. For example, the computer resulted in the emergence and rapid growth of employment of programmers, systems analysts, and computer operators, but contributed to the decline in relative importance of file clerks and other clerical occupations.

Changes in business operations, such as a shift to self service in stores, also alter the occupational structure of industries.

3) Supply-demand conditions in one occupation may affect the demand for another: For example, in hospitals, nurses aides have been substituted for registered nurses during periods when registered nurses have been in short supply.

OCCUPATIONAL EMPLOYMENT STATISTICS

As described in Chapter 1, the Occupational Employment Statistics (OES) program was established by the Department of Labor to meet the needs for local occupational data. Although sponsored and supported by the Department of Labor, funding must come from local sources for all but the 20 + original OES states. This program has the following 3 elements, each of which are operational in Arizona:

1. The Occupational Employment Statistics Survey - collects wage and salary employment data by occupation and industry from nonfarm establishments by mail. The mailing has been followed by direct contact in Arizona to achieve a 95 percent rate of survey return. State and county data is available.

2. The National/State Industry Occupation Matrix System - shows total employment in 421 occupational categories cross-classified by 9 major industrial sectors. Data is provided for the state as well as Phoenix and Tucson SMSA's.

3. The state and area Occupational Projections Program - encompasses the training of analysts in projection techniques, research on methods of developing projections, the development of computer systems, and the publication of data.

The OES survey is estimated to cover 100 percent of nonagricultural wage and salary employment within Arizona. It is considered the most reliable and accurate source of occupational employment. Projection rates were those used in the Industry/Occupation Matrix, based on average annual estimates of job openings which occur due to growth - the creation of new jobs - or replacement - jobs created when workers die, retire or otherwise leave the labor force. Openings created because of shifts from one occupation to another are not included in the estimates of job openings because of a lack of information and also because turnover does not reflect an actual new job vacancy.

ARIZONA EMPLOYMENT AND
OCCUPATIONAL PROJECTIONS
Average Annual Job Openings Due To
Growth And Replacement 1974 to 1985

Occupation PROFESSIONAL & TECHNICAL WORKERS	1977 Employment	Annual Openings
Engineers	10,504	532
Engineers, General & Sales	488	26
Aeronautical	1,086	35
Civil	1,181	86
Electrical, Electronic	4,219	218
Industrial	641	35
Mechanical	1,176	54

ARIZONA EMPLOYMENT, CON'T.

Occupation	1977 Employment	Annual Openings
Metallurgical	250	7
Mining	184	17
Safety	160	7
All Other Engineers	1,158	48
Life, Physical & Math Scientists	2,232	105
Biologist	208	7
Chemist	477	21
Forestor	330	18
Geologist, Geophysicist	482	22
Statistician	162	13
Other Life Scientists	91	4
Other Natural & Life Scientists	221	9
Other Physical Scientists	261	11
Engineering & Science Technicians	12,917	769
Biological Science Technician	980	72
Drafter	2,676	167
Electronic, Electrical Technician	4,279	241
Mechanical Engineering Technician	603	27
Surveyor	733	44
Traffic Technician	125	8
Other Engineering Technicians	2,872	174
Other Science Technicians	649	36
Medical Workers	7,965	890
Chiropractor	48	7
Dentist	517	40
Dietician	124	11
Nurse	3,152	263
Optometrist	80	9
Pharmacist	873	79
Physician	2,174	227
Physical Therapist	171	17
Podiatrist	33	3
Veterinarian	23	2
Other Therapists	770	232
Health Technologists & Technicians	1,673	169
Dental Hygienist	447	71
Medical Lab Technician	416	26
Medical Records Technician	46	7
X-Ray Technician	292	16
Other Technicians	449	49
Technicians, except Health	3,909	297
Airplane Pilot	410	14
Air Traffic Controller	229	10

ARIZONA EMPLOYMENT, CON'T.

Occupation	1977 Employment	Annual Openings
Broadcast Technician	165	10
Embalmer	86	5
Radio Operator	114	8
Other Technicians	2,905	250
Computer Specialists	2,670	157
Computer Programmer	1,457	86
Systems Analyst, Business	1,457	86
Systems Analyst, Data Processing	992	58
Systems Analyst, Science & Technical	108	6
Social Scientists	1,656	107
Psychologist	649	39
Sociologist	11	1
Urban or Regional Planner	263	20
Other Social Scientists	744	48
Teachers	35,086	1576
Adult Education	2,145	126
Counselor	824	72
Elementary School	17,799	749
Preschool or Kindergarten	2,028	82
Secondary School	7,771	73
Vocational Education	409	36
Other Teachers	4,110	335
Writers, Artists & Entertainers	3,565	217
Actor, Actress	120	-1
Announcer	412	11
Commercial Artist	536	32
Dance Instructor	129	11
Musician	569	28
Photographer	362	19
Reporter	407	32
Writer, Editor	767	61
Other Writers, Artists & Entertainers	263	22
Other Professional & Technical Workers	22,126	1459
Accountant, Auditor	5,072	286
Appraiser, Real Estate	203	22
Architect	339	21
Assessor	290	38
Buyer, Purchasing Agent	2,814	247
Caseworker	1,827	142
Clergy	164	4
Cost Estimator	709	50
Credit Analyst	468	32
Designer	811	38

ARIZONA EMPLOYMENT, CON'T

Occupation	1977 Employment	Annual Openings
Forestor	330	18
Group Recreation Worker	867	57
Judge, Magistrate	225	24
Law Clerk	256	18
Lawyer	1,987	147
Librarian	993	56
Paralegal Personnel	196	14
Personnel & Labor Relations Specialists	1,377	88
Public Relations Practitioner	316	19
Sports Instructor	213	8
Underwriter	598	24
Unemployment Claims Taker	1,058	39
Other Professional & Technical Workers	1,343	85
Managers & Officers	64,051	3927
Construction Inspectors	420	39
Director, Food Service or Catering Mgr.	263	12
Manager, Auto Parts & Service	891	51
Manager, Merchandise	1,608	91
Manager, Store	8,366	476
Postmaster	197	13
Public Administration Inspector	1,309	172
Restaurant Manager	2,602	122
Wholesaler	1,532	80
All Other Managers & Officers	46,863	2873
SERVICE WORKERS		
Food Service Workers	58,517	2842
Baker	267	13
Bartender	3,621	213
Cook, Food Preparation Worker	15,529	815
Butcher	1,852	61
Counter Attendant	4,732	242
Dining Room Attendant, Host, Hostess	5,356	87
Kitchen Helper	7,531	390
Waiter, Waitress	16,534	860
All Other Food Service Workers	3,095	161
Personal Service Workers	10,429	788
Barber	388	13
Child Care Worker	2,982	334
Cosmetologist	3,665	266
Housekeeper	354	21
Recreation Facility Aide	859	39
Social Service Aide	585	48
Usher, Lobby Attendant	765	3
Other Personal Service Workers	831	64

ARIZONA EMPLOYMENT, CON'T

Occupation	1977 Employment	Annual Openings
Health Service Workers	6,410	626
Dental Assistant	1,227	97
Licensed Practical Nurse	782	96
Medical Assistant	921	94
Medical Lab Assistant	225	14
Nurses' Aide, Orderly	3,231	322
Psychiatric Aide	24	3
Protective Service Workers	8,474	474
Correction Officer, Jailer	994	64
Detective, Police	731	42
Fire Fighter	1,324	55
Fire Officer	356	15
Police Officer	1,026	60
Police Patrolman/woman	3,196	186
Sheriff, Bailiff, Marshal	621	39
Store Detective	226	13
Other Service Workers	28,071	1,765
Fish & Game Warden	116	6
Guard, Doorkeeper	4,122	281
Janitor, Porter, Cleaner	11,583	847
Library Assistant	396	22
Maid, House Cleaner	4,463	95
School Monitor	900	52
Supervisor, Non-working, Services	946	52
Other Janitors & Cleaners	2,597	211
Other Service Workers	2,948	199
MAINTENANCE & PRODUCTION WORKERS		
Mechanics & Repairers	28,672	1092
Airplane Mechanics	1,708	58
Auto Mechanics	8,350	362
Auto Body Repairer	977	26
Diesel Mechanic	555	27
Electric Motor & Tool Repairer	227	8
Engineering Equipment Mechanic	1,271	83
Hydroelectric, Powerplant Mechanic	285	13
Maintenance Mechanic	7,903	372
Mining Machine Repairer	511	25
Office Machine Repairer	528	36
Refrigeration Mechanic	845	45
Television & Radio Repairer	1,092	42
Other Mechanics & Repairers	757	25

ARIZONA EMPLOYMENT, CON'T

Occupation	1977 Employment	Annual Openings
Laundry & Dry Cleaning Workers	2,180	65
Marker,Wet Wash Assembler	219	7
Dry Cleaning Operators	102	3
Laundry Operators	410	12
Presser	888	26
Other Laundry & Dry Cleaning Workers	561	17
Construction Trades	19,400	1279
Asbestos & Insulation Worker	194	13
Bricklayer	1,308	76
Carpenter	5,947	357
Cement Mason	1,276	78
Drywall Finisher	539	32
Electrician	4,110	298
Glazier	426	26
Lather	155	9
Painter	1,698	122
Plasterer	167	7
Plumber, Pipefitter	2,628	196
Roofer	852	65
Structural Steel & Iron Worker	2,214	148
Tile Setter, Floor Layer	480	23
Other Skilled Craft Workers	3,896	256
Metalworking Trades	6,942	407
Boilermaker	365	18
Machinist	2,704	154
Metal Fabricator	287	22
Millwright	155	13
Tool and Die Maker	530	37
Welder, Flamecutter	2,901	163
Printing Occupations	2,534	93
Bookbinder	555	22
Letter Press Operator	275	11
Lithographic Press Operator	648	21
Paste-up Worker	238	9
Photographic Developer, Printer	354	12
Other Printing Workers	464	18
Drivers & Equipment Operators	31,748	1272
Ambulance Driver	207	14
Bus Driver	2,836	197
Delivery & Route Worker	7,178	256
Heavy Equipment Operator	4,718	198
Industrial Truck Driver	1,632	68
Taxi Driver	507	18
Truck Driver	12,260	428
Other Drivers & Equipment Operators	2,390	93

ARIZONA EMPLOYMENT, CON'T

Occupation	1977 Employment	Annual Openings
Public Utilities Workers	2,651	73
Cable Installer, Splicer, Repairer	639	24
Central Office Repairer	639	24
Line Installer, Repairer	1,064	13
Station Installer	436	16
Operatives	10,947	466
Crane, Derrick, Hoist Operator	681	42
Coiler, Die Cutter Machine Operator	428	15
Conveyor Operator	347	18
Drill Press, Boring, Extruding Machine Op.	637	9
Electroplater	466	27
Grinding, Abrading Machine Operator	400	17
Lathe, Milling Machine Operator	1,341	46
Machine Tool Operator	1,005	56
Mill, Grinder Operator, Minerals	558	19
Plastics Molding Machine Operator	289	12
Punch Press Operator	391	16
Sewage, Waste Treatment Plant Operator	302	9
Stationary Engineer	604	20
Other Machine Operators	3,498	160
Industrial Assemblers	16,325	1,030
Electronics Assembler	4,381	274
Electro-Mechanical Assembler	463	29
Other Assemblers	11,481	727
Other Maintenance & Production Workers	42,904	1803
Blaster, Mining & Quarrying	128	4
Cabinetmaker	963	23
Carpet Cutter & Layer	294	14
Cleaner, Vehicle	1,861	61
Dental Lab Technician	516	41
Driller	398	17
Filer, Grinder, Buffer	488	24
Furniture Finisher, Upholsterer	247	11
Highway Maintenance Worker	1,414	51
Household Appliance Installer	132	8
Inspector	2,503	156
Instrument Repairer	363	17
Jeweler, Silversmih	330	20
Oiler, Mixer	654	19
Optician, Lens Grinder	404	35
Order Filler	1,676	100
Painter, Auto	364	15
Painter, Production	386	16
Pipelayer	260	19
Production Packager	2,231	126

ARIZONA EMPLOYMENT, CON'T

Occupation	1977 Employment	Annual Openings
Refuse Collector	707	61
Stock Clerk, Warehouse	6,184	370
Supervisor, Non-working	8,919	492
Tailor, Alterations	463	35
Tester	1,090	68
All Other Semi-Skilled Workers	9,929	492
Unskilled Workers, Laborers & Helpers	34,908	1,407
Bagger	2,823	100
Construction Crafts Helper	6,494	239
Fuel Pump Attendant	4,969	162
Gardener, Groundskeeper	3,100	233
Surveyor Helper	421	25
Tire Changer	757	25
Truck Driver Helper	423	15
Other Laborers & Unskilled Workers	15,921	601
Food Processing Workers	910	48
Baker	346	16
Butcher	220	14
Skinner, Animal	193	10
Other Food Processing Workers	151	8
CLERICAL WORKERS		
Office Machine Operators	7,517	287
Bookkeeping, Billing Machine Operator	1,105	52
Computer Operator	1,356	79
Keypunch Operator	2,310	42
Calculating, Duplicating Machine Operator	998	57
Other Office Machine Operators	1,748	57
Clerical Workers	126,277	8,972
Accounting Clerk	5,124	275
Bookkeeper, Hand	7,065	379
Cashier	12,786	682
Claim Adjuster, Examiner	1,455	51
Collector	781	53
Counter Clerk	461	31
File Clerk	1,775	109
General Office Clerk	20,991	1,446
Mail Clerk	522	27
Medical Insurance Clerk	552	19
Order Clerk	1,233	62
Payroll, Timekeeping Clerk	915	70
Receptionist	3,651	315
Secretary	17,944	1,449

ARIZONA EMPLOYMENT, CON'T

Occupation	1977 Employment	Annual Openings
Statistical Clerk	513	30
Stenographer	1,498	17
Survey Worker	599	22
Telephone Operator	4,223	116
Teller	4,064	265
Typist	8,645	647
Supervisor, Clerical	2,425	166
Postal Clerk	843	44
Postal Mail Carrier	4,237	197
Teacher Aide	6,291	564
Welfare Eligibility Worker	429	40
Other Clerical Workers	17,255	1,896
Plant Clerical Workers	16,841	1,070
Dispatcher	982	53
Meter Reader, Utilities	246	9
Production Clerk	1,755	127
Shipping Packer	1,579	90
Shipping, Receiving Clerk	2,266	114
Stock Clerk	8,082	483
Transportation Agent	276	12
Other Plant Clerical Workers	1,655	182
SALES WORKERS	51,713	3,024
Sales Representative, Agent	22,967	1,311
Sales Agent, Real Estate	751	69
Sales Agent, Insurance	1,939	78
Sales Agent, Securities	455	29
Sales Clerk	25,178	1,512
Other Sales Agents & Representatives	423	25

III.
The Status of Supply: Occupational Training

The Nation is increasingly shifting from blue-collar to white-collar occupations which often require higher levels of education and skill acquired through formal training. Although blue-collar jobs are projected to grow more slowly than average, an increasingly large proportion of blue-collar workers are expected to be craft workers, who require more training than other blue-collar workers. In addition, the proportion of formally educated workers within occupations has been increasing. As these trends continue, more jobs than ever before will require specialized training. Furthermore, occupational training is being broadened to prepare workers for the changing nature of jobs and for changing labor market conditions.

On the Arizona scene these national trends have been emphasized. High technology manufacturing industries and the continuing growth of tourism are two factors which provide a concentration of jobs requiring increasing levels of education and training.

This chapter presents data on several sources of education and training. The discussions of occupational training cover the nature of training programs, available data on graduates, uses of data for supply-demand analysis, and problems associated with using data. Chapter IV discusses specific training needed to enter many occupations, although, of course, many educational programs do not directly translate into jobs. A degree such as Liberal Arts may qualify a person for a wide variety of occupations which require simply "a college degree." Conversely, many jobs do not have formalized training or education requirements.

Data on occupational training are most useful when accompanied by entry rate information because not all graduates of training programs for particular occupations enter those occupations. In the past, this has been particularly true for women graduates who frequently deferred entering the labor market to

marry or raise children. Therefore, the numbers of graduates of programs generally dominated by women, were not indicative of the number of persons entering the labor force for those occupations. This example indicates how entry rates may vary between occupations and change over time.

VOCATIONAL EDUCATION

Vocational education includes secondary, post-secondary and adult vocational and technical programs funded under the Vocational Act of 1963, as amended by the Vocation Education Amendments of 1968. The legislation provides that vocational-technical education includes within its scope all occupations which are not generally considered professional and do not require a baccalaureate or higher degree.

Vocational education is conducted on three levels. Secondary vocational education is provided to high school students as part of the curriculum and includes academic as well as vocational courses. (Only seniors are listed in the following tabulations as they are the most likely to be entering the labor market following training.) Post-secondary vocational education is for persons who have completed or left high school and are available for full-time study in preparation for entering the labor market. Adult education (supplemantal) retrains as well as upgrades skills of persons already in the labor market. (The acquisition of new or improved skills frequently allows these trainees to change occupations.)

Types of training available. Originally, vocational education emphasized agricultural, trade, and industrial education. It now includes other areas such as distributive occupations (wholesale and retail trade), health, home economics, and office occupations. Consumer and homemaking skills are another area, but the relation between training and jobs in this field is indirect. Most curriculums are designed to prepare students for specific occupations.

Completions and placements. Of the 8,096 persons who completed vocational education programs in Arizona in 1977, approximately 69 percent were available for placement. Of these, about 36 percent obtained employment in the field for which they were trained, or in a related field; 22 percent were employed in other fields; and 4 percent were unemployed. (For more information on Voc-Ed programs in Arizona, see "The Product Talks", the State Advisory Council on Vocational Education).

The data. A major limitation is present in using the vocational education statistics from the Arizona Department of Education. Students are counted each time they enroll in a class which frequently leads to multiple counts. For example, a student may enroll in three auto mechanics classes during the year and be counted three times while another student may be counted once for the one class he/she enrolled in. Only high school seniors are noted in the job openings comparisons in Chapter IV since adult classes are also counted on junior college and other totals.

Table 2

Vocational Education
Individual Class Participants 1977-78 School Year

Class Title	Voc. Ed. Code	High School Seniors	Adult Preparation	Adult Supplemental
Agriculture				
Agriculture	01.0020	140	1	
Ag. Production	01.0100	258		
Animal Science	01.0101	20		
Farm Business Mgmt.	01.0104	34		108
Ag. Production, Other	01.0199	27		
Ag. Supplies, Services	01.0200	21		
Ag. Chemicals	01.0201			79
Ag. Mechanics	01.0300	186		
Ag. Power & Machinery	01.0301	5		
Ag. Mechanics Skills	01.0399	5		
Ag. Production	01.0400	8		
Ornamental Horticulture	01.0500	146		
Horticulture	01.0502			12
Greenhouse Operations	01.0503	5		
Landscaping	01.0504	11		
Ag. Resources	01.0600	25		370
Range Mgmt.	01.0608	4		
Agriculture, Other	01.9900	20		
Distributive Education				
Distributive Education	04.0000	20		
Distributive Education	04.0020	222		1,278
Advertising	04.0100			89
Apparel & Acc.	04.0200	15		
Finance & Credit	04.0400	18	6	1,179
Food Distribution	04.0600	24		11
General Merchandising	04.0800	47		272
Hotel & Lodging	04.1100			52
Industrial Marketing	04.1200	13		70
Insurance	04.1300			555
International Trade	04.1400			78
Personal Services	04.1500			68
Real Estate	04.1700			769
Recreation & Tourism	04.1800			240
Transportation	04.1500			226
Retail Trade, Other	04.2000			36
Dist. Ed., Other	04.9000	4	31	9,579
Health Occupations				
Health	07.0020	27		
Dental Hygiene	07.0102			76
Dental, Other	07.0199			49
Nursing	07.0300	27		114

Class Title	Voc. Ed. Code	High School Seniors	Adult Preparation	Adult Supplemental
Nursing (Assoc. Degree)	07.0301			946
Practical Nursing	07.0302	39	33	283
Nurse Aide	07.0303	49	60	9
Home Health Aide	07.0307			107
Rehabilitation	07.0499			20
Electocard. Tech.	07.0902			5
Central Supply Tech.	07.0905	1		
Med. Emergency Tech.	07.0907			24
Food Services Super.	07.0908			31
Health Occ., Other	07.9900	15	4	2,054
Home Economics				
Homemaking	09.0100	247		
Home Economics	09.0101	915		
Child Development	09.0102	1,825		1,399
Clothing & Textiles	09.0103	1,136	121	166
Consumer Education	09.0104	134		155
Family Health	09.0105	54		
Family Relations	09.0106	2,979		79
Foods & Nutrition	09.0107	1,514	15	456
Home Mgmt.	09.0108	77		26
Housing Home Furnish.	09.0109	707		442
C & H Depressed Area				
Project	09.0190	122	2	5,613
Other Home Ec.	09.0199	1,390	1	13
Occupational Prep.	09.0200	20		
Child Care	09.0201	63		40
Food Mgmt.	09.0203	143		23
Home Furnishings	09.0204	7		42
Institutional Mgmt.	09.0205			60
Occ. Home Economics	09.0220	21		
Office Occupations				
Accounting	14.0100	264	76	73
Data Processing	14.0200	327	6	21
Computer Oper.	14.0201	8		
Computer Programmer	14.0203	5		
Other Business	14.0299			59
General Office Clerical	14.0300	1,809	20	16
Info., Communications	14.0400			47
Personnel Trng. & Rel.	14.0600			870
Steno., Secretarial	14.0700	860	35	543
Supvry. & Adm. Mgmt.	14.0800	6		40
Adm. Assistant	14.0801			32
Budget Mgmt. Analysis	14.0802			9
Typing	14.0900	1,287	175	
Office Occ., Other	14.9900	18		

(Cooperative & Work Experience programs not listed since they involve a wide variety of occupational fields.)

Class Title	Voc. Ed. Code	High School Seniors	Adult Preparation	Adult Supplemental
Technical Occupations				
Engineering Tech.	16.0100			29
Electronic Tech.	16.0108			13
Environmental Tech.	16.0110			36
Eng. Tech., Other	16.0199			17
Police Science	16.0605	1		78
Water & Waste Tech.	16.9902			20
Trades, Crafts and Industrial Occupations				
Air Conditioning	17.0100	18	2	
Air Cond., Other	17.0199	13	2	
Appliance Repair	17.0200	12	2	
Auto Service	17.0300	106		
Body and Fender	17.0301	242	3	13
Mechanics	17.0302	1,269	3	24
Auto Services, Other	17.0399	56		12
Aircraft Maint.	17.0401	45		1
Commercial Art	17.0700	77	5	42
Construction Trades	17.1000	220		20
Carpentry	17.1001	163	7	
Electricity	17.1002	3		43
Const. & Maint. Trades	17.1099	32		52
Diesel Mechanic	17.1200	40		2
Drafting	17.1300	119	5	27
Electrical Occup.	17.1400	26		
Industrial Electrician	17.1401	5		100
Elec. Line Installer	17.1402			483
Elec. Occupations, Other	17.1499	5		
Electronics	17.1500	130	3	
Fabric Maintenance	17.1600	13	1	
Graphic Arts	17.1900	57		
Printing Occup.	17.1902	79	4	15
Other Graphic Arts	17.1999	8		144
Metalworking	17.2300	35		
Machine Shop	17.2302	47	4	2
Metal Trades	17.2304	30		
Sheet Metal	17.2305	15	4	
Welding	17.2306	313	25	4
Metalwork, Other	17.2399	8		
Metallurgy	17.2400			1,429
Cosmetology	17.2602	437	91	
Personal Services, Other	17.2699	1		
Plastics Occup.	17.2700	1	11	
Public Service	17.2800			105
Firefighter	17.2801		72	1,640
Law Enforcement	17.2802	33		60
Public Service, Other	17.2899	35	5	340
Quantity Food Occup.	17.2900	13	2	
Baker	17.2901	41	5	

Class Title	Voc. Ed. Code	High School Seniors	Adult Preparation	Adult Supplemental
Cook, Chef	17.2902	56	5	
Refrigeration	17.3000	6		
Small Engine Repair	17.3100	4		
Textile Production	17.3300	22	2	
Upholstering	17.3500	105	5	
Woodworking	17.3600	10		
Millwork, Cabinetmaking	17.3601	22	6	
Trade & Ind. Occup., Other	17.9900	24		123

APPRENTICESHIP PROGRAMS

Training authorities recommend formal apprenticeship training as the best way to acquire all-around proficiency in a skilled craft. It provides a thorough knowledge of the trade and enables the apprentice to perform most tasks completely.

Most apprenticeship programs have committees of employers and local trade unions which interview applicants, review the trainee's progress, and determine when an apprenticeship has been completed satisfactorily. In Arizona the Apprenticeship Information Center is located at 207 East McDowell in Phoenix. The Apprenticeship Services Components of the Department of Economic Security provides support services and maintains the records of the Advisory Committee. No estimate is available of the number of apprentices in programs that are not registered.

The Department of Labor's Bureau of Apprenticeship and Training (BAT) registers but does not finance apprenticeship programs. BAT provides technical assistance and support to state apprenticeship agencies and to employers and unions in establishing and maintaining programs. In addition, BAT maintains records of new registrations, completions and cancellations of apprenticeship for each apprenticeable trade by state. Of the 3,107 registered apprentices in Arizona in December 1978, 71 percent were in the construction trades, 9 percent in metalworking, 8.4 percent in public utilities, 6.5 percent in mechanics and 6.1 percent in other trades.

Since the mid-1960's apprenticeship registrations have increased significantly. Training craftworkers to meet future requirements has become a common goal for employers, unions, and government officials - particularly those in employment and training programs. The following table presents apprenticeship registrations, withdrawals (those who leave the program) and completions. Apprenticeship cancellations which represent a potential loss of highly trained workers may not be as serious as it appears; however, since many dropouts eventually become skilled journeymen through less formal means. Many apprentices drop their apprenticeship when jobs are plentiful because of the opportunity to work at the journeyman level for higher wages.

Women currently represent 2.7 percent of registered apprentices in Arizona. New federal regulations requiring women on govenment financed construction should increase the entrance of women into apprenticeable trades.

Table 3

Training Status of Registered Apprentices in All Trades
Arizona 1978

Occupation	Active 1-1-78	Actions in Period			Active 12-31-78
		Register	Complete	Cancel	
Construction Trades					2,213
Electrician	367	140	139	18	354
Asbestos Worker	27	24	7	3	41
Pipefitter, Plumber	213	111	60	13	261
Bricklayer	49	108	6	41	114
Caulker, Tuckpointer		1		1	
Cabinetmaker	13			4	9
Carpenter	415	375	120	90	580
Cement Mason	33	101	6	24	104
Floor Coverer	38	22	6	11	43
Glazier	12	3		1	14
Sheet Metal Worker	81	73	37	10	107
Iron Worker	141	123	43	26	195
Lather	17	26		7	36
Painter	75	77	6	27	100
Steel Fitter	15		5	1	9
Drywall Taper & Finisher	33	44	7	11	59
Plasterer	24	28	4	23	25
Roofer	131	83	21	76	101
Sprinkler Fitter	47	12	5	1	53
Tile Layer	13	1	2	4	8
Public Utilities	1				262
Elec. Power Line Worker	112	41	19	9	118
Electric Meter Worker	15	3	2		15
Electrician	49	26	17	3	55
Instrument Repairer	36	13	12	2	35
Machinist	21	9	10		20
Systems Operator					1
Electric Relay Worker	3		2		1
Transformer Repairer	1	1			
Gas Fitter	3		1		2
General Utility Repairer	4		3		1
Electronics Technician		1			1
Construction Maintenance	2		2		
Metal Fabricator	6	3	2		7
Cable Worker	11	1	8	1	3
District Developer	5		2	1	2
Telephone Installer	1				1
Graphic Arts					25
Cameraman	1			1	
Stripper	1	2			1
Offset Press Operator	7	1		1	7
Bookbinder	1	1			2

Table 3

Training Status of Registered Apprentices in All Trades (Continued)
Arizona 1978

Occupation	Active 1-1-78	Actions in Period			Active 12-31-78
		Register	Complete	Cancel	
Photocompositor	7	2	2	4	3
Litho Worker	2	1	2		1
Webb Press Operator	10	8	7		11
Auto Mechanics					32
Auto Machinist	1		1		
Front End & Brake Worker	1				1
Mechanic	31	32	10	1	30
Tune-Up Technician		1			1
Metalworking					281
Boilermaker	155	50	20	6	179
Machinist	69	17	8	27	52
Millwright	25	9	6	5	23
Tool & Die Maker	5	3			8
Lead Burner	3		1		2
Mold Maker	9	4			13
Blacksmith	1	1			2
Metalsmith	3		1		2
Other Mechanics & Repairers					172
Business Machine Mechanic	3	5			8
Heavy Duty Mechanic	49	59	12	15	81
Mine Mechanic	12	4	9	1	6
Maintenance Mechanic	13	11	8	2	14
Shovel & Drill Mechanic	1	2	1		2
Locomotive Mechanic	2		1		1
Heavy Equip Ref. Mech.	1				1
Maintenance Electrician	15	3	2		16
Mechanic Welder	33	19	8	8	36
Service Repairer	5	6	2	2	7
Misc. Occupations					159
Cook	16	20		1	35
Meat Cutter	2	3			5
Sign Builder	7		1		6
Sign Electrician	3				3
Surgical Orthotist	2				2
Railroad Car Worker	1	2	1		2
Warehouse Worker		2			2
Equipment Operator	40	42	13	13	56
Plant Equip. Operator	24	29	3	7	43
Limb Shop Prosthetist	1				1
Sound & Public Address	3	1			4
Total Apprentices	2,546	744	429	217	3,107

COMMUNITY AND JUNIOR COLLEGES

Community colleges serve many functions. For some students, they provide the first two years of academic training leading to a bachelor's degree. For others, they offer educational programs which prepare students for specific occupations upon graduation.

Although the typical program lasts two years or more, a number of courses can be completed within one year. Types of career education include business, data processing, health and paramedical services, mechanical and engineering technologies, natural science, and public services such as law enforcement.

Through the Higher Education General Information Survey (HEGIS), the National Center for Education Statistics (NCES) compiles data on associate degrees and other awards below the baccalaureate level. These data are collected by the Arizona Commission for Post-secondary Education.

The data provided are in some cases classified by relatively broad curriculum areas. For example, according to the latest survey, 43 awards were granted in "General Data Processing Technologies." In the absence of detailed descriptions of the curriculum content leading to these awards, their treatment as potential supply in more narrowly defined occupations such as computer programmer, operator, or peripheral equipment operator have some weaknesses. However, meaningful estimates of the availability of graduates in many occupations can be made by grouping the more narrow specialties.

Table 4
Associates Arts Degrees and Certificates Conferred by
Arizona Colleges and Universities - 1977-78 School Year

Code HEGIS	Subject Area	Associate of Arts Degrees	Other Certificates	Less Than Two Year Curriculum
5000	BUSINESS & COMMERCE, TOTAL	484		45
5001	General Business	103		14
5002	Accounting	21		4
5003	Banking & Finance	11		7
5004	Marketing	166		4
5005	Secretarial	114		49
5008	Communications, Broadcasting	7		
5009	Printing & Lithography	10		
5010	Hotel & Restaurant Management	7		13
5012	Graphic Arts	35		52
5099	Other	20		
5100	DATA PROCESSING TECHNOLOGIES, TOTAL	74		35
5101	General Data Processing	43		
5102	Keypunch Operation			16
5103	Computer Programmer	31		
5104	Computer & Peripheral Equip. Oper.			19

(Table continuation)

Code HEGIS	Subject Area	Associate of Arts Degrees	Other Certificates	Less Than Two Year Curriculum
5200	HEALTH SERVICES & PARAMEDICAL TECHNOLOGIES, TOTAL	623		272
5202	Dental Assistant	14		55
5203	Dental Hygiene	22		
5204	Dental Lab. Technician	7		
5205	Medical Lab. Technician	9		
5207	Radiology (X-Ray) Tech.	65		
5208	Registered Nurse	469		37
5209	Licensed Practical Nurse	1		112
5211	Surgical Technician	2		8
5212	Optical Technician	16		
5213	Medical Records Technician	18		
5215	Inhalation Therapy Technician	46		38
5299	Unit Clerk			44
5300	MECHANICAL AND ENGINEERING TECHNOLOGIES, TOTAL	432	409	156
5301	General Technology	27		1
5302	Aeronotical Technology	64		
5303	Engineering Graphics (Drafting)	24		2
5304	Architectural Drafting	25		3
5306	Auto Technology	86		76
5307	Diesel Technology	14		15
5308	Welding	18		9
5309	Civil Engineering Technology	7		
5310	Electronics Technician	314	409	4
5311	Electromechanical Tech	51		36
5312	Industrial Technology	5		11
5317	Construction Technology	13		7
5399	Other Technologies	4		
5400	NATURAL SCIENCE TECHNOLOGY, TOTAL	67		
5402	Agriculture	22		
5403	Forestry	7		
5404	Food Service	7		
5405	Home Economics	15		
5499	Other Natural Sciences	16		
5500	PUBLIC SERVICE TECHNOLOGY, TOTAL	448	1	25
5503	Education (Teacher Aide)	38		6
5504	Library Assistant	10		1
5505	Police, Law Enforcement	247	1	12
5506	Recreation, Social Work	117		3
5508	Public Adm.	6		
5599	Other	30		3
5600	GENERAL PROGRAMS, TOTAL	2,172		24

COLLEGES AND UNIVERSITIES

College training covers a wide range of subjects -- including engineering, natural sciences, humanities, arts, business, law, and medicine. Most bachelor's degree programs require four years, and professional training requires several additional years.

The Arizona Commission for Post-secondary Education collects data on numbers of institutions, enrollments, and earned degrees from public and private institutions. The following data is from the Higher Education General Information Survey.

The number of post-secondary educational institutions in Arizona has increased from 232 in 1975, 259 in 1976, to 303 in 1977. Enrollments in colleges and universities have increased steadily since the late 1940's; however, the rate of increase has been declining in recent years. Some Arizona schools have experienced drops in enrollments. The number of earned degrees has closely followed the enrollment trends. Earned degree statistics by curriculum and degree level are presented in the following tables and in the discussions of individual occupations in Chapter 4.

Entry Rates. The proportions of graduates of occupationally oriented programs directly entering related occupations tend to be very high, particularly if training takes a number of years. For example, almost 100 percent of the medical school graduates enter medicine and over 85 percent of engineering school graduates enter engineering. For many liberal arts graduates, however, particularly at the bachelor's degree level, entry rates into occupations directly related to a college major are substantially lower. Liberal arts training tends to be less occupationally oriented. While it may prepare graduates for immediate entry into directly related occupations, it also provides necessary preparation for entry into professional schools, teaching, or occupations where a college degree in any one of a number of fields may be adequate preparation. Entry rates are calculated from follow-up studies of persons during or after their training. Generally, these include data on field of study and intended or current occupation.

Table 5
Degrees Conferred By Arizona Colleges and Universities
1977-1978 School Year

Code HEGIS	Subject Area	Degrees Conferred Bachelor's	Master's	Doctor's
0100	AGRICULTURE TOTAL AND NATURAL RESOURCES,	363	74	18
0101	Agriculture	10	17	
0102	Agronomy	25	6	5
0103	Soils Science	12	4	6
0104	Animal Science	62	6	
0107	Fish, Game & Wildlife Management	9	1	
0108	Horticulture	46	7	1
0111	Agriculture Economics	14	7	
0114	Forestry	41	4	
0115	Natural Resources Management	9		
0117	Range Management	6	3	
0199	Other	129	19	6
0200	ARCHITECTURE AND ENVIRONMENT DESIGN, TOTAL	219	16	
0201	Environmental Design	10		
0202	Architecture	118	4	
0203	Interior Design	73		
0204	Landscape Architecture	18	1	
0206	City, Community & Regional Planning		11	
0300	AREA STUDIES, TOTAL	19	12	
0308	Latin American Studies	12	12	
0399	Other Area Studies	7		
0400	BIOLOGICAL SCIENCES, TOTAL	466	80	52
0401	General Biology	220	22	8
0402	Botany	18	5	3
0404	Plant Pathology	10	5	1
0407	Zoology	67	8	10
0410	Physiology		1	3
0411	Microbiology	90	12	1
0414	Biochemistry	1	3	9
0417	Cell Biology	5		1
0420	Environmental Sciences	10		
0421	Entomology	6	7	4
0422	Genetics		7	6
0424	Nutrition	4		
0426	Toxicology		6	
0499	Other Biological Sciences	35	4	6
0500	BUSINESS AND MANAGEMENT, TOTAL	1,752	1,087	13
0501	Business, General	140	60	6
0502	Accounting	474	43	
0504	Banking & Finance	122	16	
0506	Business Management	206	14	
0508	Hotel & Rest. Management	13		

Code HEGIS	Subject Area	Degrees Conferred Bachelor's	Master's	Doctor's
0509	Marketing	290	7	
0510	Transportation & Public Utilities	12		
0511	Real Estate	50		
0512	Insurance	28		
0514	Secretarial Studies	5		
0515	Personnel Management	25		
0517	Business Economics	57	7	1
0599	General Business Admin.	260	214	6
0599	International Management		697	
0599	Other Business & Management	70	29	
0600	COMMUNICATIONS, TOTAL	331	24	
0601	General Communications	86	9	
0602	Journalism	92	15	
0603	Radio/TV	115		
0604	Advertising	23		
0605	Communications Media	12		
0699	Speech & Hearing	3		
0700	COMPUTER & INFORMATION SERVICES, TOTAL	79	26	1
0701	Computer & Information Services	46	25	1
0703	Data Processing	10		
0799	Quantitative Systems	5		
0799	Business Analysis	7		
0799	Electronic & Computer Engineering	11	1	
0800	EDUCATION, TOTAL	1,754	1,566	149
0801	General Education			61
0802	Elementary Education	677	344	6
0803	Secondary Education	353	207	9
0805	Higher Education		5	2
0806	Community College Education		11	
0807	Adult Education		8	3
0808	Special Education	268	252	7
0815	Speech Correction	34	29	1
0821	Social Foundations		17	3
0822	Educational Psychology		21	8
0826	Student Personnel		282	5
0827	Educational Administration		50	21
0829	Curriculum			5
0830	Reading		32	
0831	Art Education	24	67	7
0832	Music Education	25	13	1
0833	Math Education	3		
0834	Science Education	26	6	1
0835	Physical Education	101	71	
0836	Driver & Safety Education		7	
0837	Health Education	35	3	
0838	Business, Commerce, Dist. Education	20	19	3
0839	Industrial Arts Education		4	1
0899	Other Education	188	118	5

Code HEGIS	Subject Area	Degrees Conferred		
		Bachelor's	Master's	Doctor's
0900	ENGINEERING, TOTAL	755	181	21
0901	General Engineering	9	37	9
0902	Aerospace Engineering	7	2	
0903	Agricultural Engineering	3	1	
0906	Chemical Engineering	46	10	
0908	Civil Engineering	122	16	1
0909	Electrical, Electronic Engineering	98	46	7
0910	Mechanical Engineering	81	15	1
0911	Geological	15	4	
0913	Industrial, Management Engineering	6	17	
0915	Materials Engineering	6		
0918	Mining Engineering	17	3	
0919	Engineering Physics	6		
0920	Nuclear Engineering	16	5	2
0925	Engineering Technologies	301	11	
0999	Engineering Science	22	14	1
1000	FINE AND APPLIED ARTS, TOTAL	409	133	6
1002	Art	150	62	
1003	Art History	19	4	
1004	Music (Performing)	87	22	6
1005	Music	10	29	
1007	Dramatic Arts	61	16	
1008	Dance	13		
1009	Applied Design (Crafts)	35		
1011	Photography	23		
1099	Other Arts	11		
1100	FOREIGN LANGUAGES, TOTAL	122	54	9
1101	Foreign Languages	2	2	
1102	French	20	4	1
1103	German	11	7	
1104	Italian	1		
1105	Spanish	43	19	6
1106	Russian	13	4	
1107	Chinese	3		
1108	Japanese	1		
1199	Other Foreign Languages	28	18	2
1200	HEALTH PROFESSIONS, TOTAL	515	50	
1201	General Health	10		
1202	Hospital Administration	22		
1203	Nursing	278	47	
1211	Pharmacy	78	2	
1212	Physical Therapy	18		
1213	Dental Hygiene	21		
1220	Speech Pathology	5	1	
1223	Medical Lab Technologies	49		
1299	Other Health Professions	32		

Code HEGIS	Subject Area	Degrees Conferred Bachelor's	Master's	Doctor's
1300	HOME ECONOMICS, TOTAL	268	39	
1301	Home Economics	175	27	
1303	Clothing	9		
1304	Consumer Economics	2		
1305	Family Relations	20		
1399	Other Home Economics	33		
1500	LETTERS, OTHER	237	105	16
1501	English	155		
1504	Classics	3		
1505	Linguistics	2	6	1
1506	Speech, Debate	23	2	2
1507	Creative Writing	34	3	
1508	Teaching English as a Foreign Lang.		32	
1509	Philosophy	17	9	1
1600	LIBRARY SCIENCE		98	
1700	MATHEMATICS, TOTAL	78	25	3
1701	Mathematics	77	25	3
1702	Statistics	1	2	
1703	Applied Math		1	
1900	PHYSICAL SCIENCES, TOTAL	235	111	56
1901	Physical Sciences	14	10	5
1902	Physics	22	6	7
1905	Chemistry	100	16	19
1911	Astronomy	7	1	3
1913	Meteorology		3	4
1914	Geology	44	21	1
1917	Earth Sciences	5		
1920	Metallurgy		2	2
2000	PSYCHOLOGY, TOTAL	365	43	30
2001	Psychology	332	33	30
2004	Counseling Psychology	1		
2099	Other Behavioral Sciences	32	10	
2100	PUBLIC AFFAIRS & SCIENCES, TOTAL	411	142	
2102	Public Administration	41	44	
2103	Parks & Recreation Management	112		
2104	Social Work	104	78	
2105	Law Enforcement	141	15	
2199	Other Public Affairs & Service	12	5	
2200	SOCIAL SCIENCES, TOTAL	966	201	31
2201	Social Science	48	8	
2202	Anthropology	111	45	16
2204	Economics	25	6	
2205	History	169	21	5

Code HEGIS	Subject Area	Degrees Conferred Bachelor's	Master's	Doctor's
2206	Geography	51	26	5
2207	Political Science	243	47	4
2208	Sociology	186	27	5
2213	Mexican-American Studies	2		
2299	Criminal Justice	131	22	
2300	THEOLOGY			
2301	Theology	39 Associate Arts		
4900	INTERDISCIPLINARY STUDIES, TOTAL	52	17	
4901	General Studies	29		
4903	Humanities	16	9	
4904	Engineering	5		
4999	Other Studies	2	8	
	Professional Awards			
1206	Medicine (M.D.)			95
1401	Law (LL.B. or J.D.)			240

EMPLOYER TRAINING

In employer training, workers learn occupations either formally or informally, usually on the job. Both skilled and semiskilled occupations have at least three on-the-job training paths -- apprenticeship, formal on-the-job instruction, and learning by doing. Apprenticeship programs, discussed in a preceding section, represent formal employer training with skills acquired at work in conjunction with related classroom instruction. Formal on-the-job training may range from structured lessons by designated instructors to periodic instruction from supervisors and other employees.

In most instances, employer training takes place informally within the work environment. Most workers, according to a study[1] by the Department of Labor, had "just picked up" their current skills informally on the job by observing fellow workers, practicing during lunch hours and breaks, and by asking questions of experienced workers.

The lack of data on employer training hinders proper labor supply analysis. The Department of Labor conducted a nationwide survey[2] of employer training for 14 occupations in selected metalworking industries. These industries include SIC (Standard Industrial Classification) 33 through 37 - primary metal, fabricated metal products, machinery, electrical and electronic

1"Formal Occupational Training of Adult Workers". Manpower/Automation Research Report No. 2 (U.S. Department of Labor, Dec. 1964).

2"Occupational Training in Selected Metalworking". BLS Bulletin 1976, ETA R & D Monograph 53. (Department of Labor, 1977).

machinery and transportation equipment. For purposes of this study, training was defined as a structured program provided by employers. Training could be given on the job, in a classroom or through a combination of the two. Training was differentiated from work experience by specifying that training required an instructor.

The following table presents the Arizona employment of the 14 occupations and the estimated completions of employer training based on the results of the national survey.

Table 6
Estimated Employer Training Completions for Selected Occupations in Metalworking Industries

Occupation	Estimated AZ 1977 Employment	Employer Training Completions
Crane, Derrick & Hoist Operator	85	6
Electrician	334	34
Electroplater	371	15
Filer, Grinder, Buffer	448	11
Layout Workers, Metal	117	7
Machine Tool Setters	117	7
Machinist	1,386	60
Mechanic, Maintenance	245	13
Millwright	7	1
Patternmaker, Metal/Wood	9	1
Plumber, Pipefitter	64	7
Sheet-Metal Worker	679	50
Tool & Die Maker	480	11
Welder, Flamecutter	1,086	123

FEDERAL EMPLOYMENT & TRAINING PROGRAMS

The federal government has sponsored employment and training programs on a formal basis since the enactment of the Manpower Development and Training Act (MDTA) of 1962. With the passage of the Comprehensive Employment and Training Act (CETA) of 1973, this nationally directed program was replaced by a decentralized system of federal, state and local employment and training activities. Although a few programs, such as Work Incentive (WIN) have been retained, under direct federal control, most federal funds are distributed to state and local governments, and along with them, the responsibility of planning and managing programs. The federal government however, has retained oversight and technical assistance functions.

Comprehensive Employment & Training Act

In fiscal year 1978, there were 450 eligible units of government called prime sponsors receiving CETA funds. Arizona prime sponsors are the City of Phoenix, Maricopa Employment & Training Administration, Tucson-Pima Consortiun and Balance of State. The Tucson Pima Consortium may divide into two separate prime sponsorships, one for the City of Tucson and one for the Balance of Pima County. The employment and training programs of these prime sponsors can include -- but are not limited to:

* Outreach to make needy persons aware of available employment and training services.

* Assessment of individual needs, interests, and potential; referral to appropriate jobs or training; and followup to help new workers stay on the job.

* Orientation, counseling, education, and classroom skill training to help prepare for jobs.

* Subsidized on-the-job training.

* Allowances to support trainees and their families and needed services, such as child care and medical aid.

* Labor market information to facilitate planning.

* Transitional public service jobs.

* Special programs for groups such as Indians, migrants, ex-offenders, displaced homemakers, and youth.

The Act also provides that employment and training services be provided to the unemployed, underemployed, and economically disadvantaged. Data on training is not currently available, although the new Management Information System, required by the CETA Reauthorization Act of 1978, should provide detailed program data by 1981. Since the Skill Centers in Maricopa and Pima Counties represent the majority of actual occupational training provided under various CETA titles, graduates of these facilities have been listed as representative of CETA training programs, although training is also provided in other facilities.

Table 9
Maricopa County Skill Center
October 1977 through September 1978

Occupational Cluster	Total Enrolled	Completed
Air Conditioning Mechanic	54	34
Automotive	69	33
Cashier Sales	94	77
Clerical (Secretary)	416	257
Culinary Arts (Cook)	76	53
Health Services (Nurses Aides)	254	177
Meat Cutting	145	82
Welding	174	118
Auto Body Painter	57	34
Bank Teller	65	52
Machinist	77	48
Hospitality	77	49
Electronics Assembler	151	99
Medical Transcriber	22	1
Total	1,776	1,142

Table 9a
Tucson Skill Center
October 1977 through September 1978

Occupational Cluster	Total Enrolled	Graduated
Auto Body Painter	51	26
Auto Mechanic	91	52
Electrician Helper	59	35
Health Aide	166	101
Meat Cutter	65	27
Building Maintenance	65	27
Bank Teller	64	47
Office Clerk	173	105
Total	669	420

Job Corps

The Job Corps is another program aimed at providing occupational skill training for economically disadvantaged young people. High school dropouts between 16 and 21 years of age who have records of low educational achievement, have been out of work for at least three months, or can benefit from full-time residential assistance are eligible for the program. The Job Corps is different from other training programs in that centers provide residential living and serve their enrollees 24 hours a day, seven days a week.

It is difficult to use Job Corps data to determine entrants to occupations because much of the training is remedial education in basic reading and mathematical skills and not related to specific occupations. The following data is from the Phoenix Center. Tucson Job Corps opened in 1978 and will also be supplying trained workers.

Table 7
Job Corps
Phoenix, Arizona
October 1977 through September 1977

Occupational Cluster	Graduates	Placements
Accounting Clerk	2	2
Air Conditioning Installer	1	1
Auto Mechanic Helper	6	6
Baker	1	1
Bricklayer	19	19
Carpenter	33	35
Cement Mason	11	12
Clerical (Secretary)	53	60
Clerk-Typing	6	7
Custodial	12	12
Electronic Assembler	97	101
File Clerk	45	51
Keypunch Operator	1	1
Licensed Practical Nurse	1	1
Meat Cutter	1	1
Nursing Assistant	17	19
Painter	20	20
Plasterer	12	12
Service Station Attendant	51	58
Welder	20	20

*Job Corps, Report #1; Phoenix, Arizona. September 1978.

Work Incentive (WIN) Program

This program stresses economic independence for all employable persons age 16 and over in families receiving Aid to Families with Dependent Children (AFDC). Originally a voluntary program, WIN is now mandatory for all AFDC recipients except those officially exempted by amendments to the Social Security Act. The WIN Program seeks to refer welfare recipients directly to jobs. Where training is required, it is to take place at the job site whenever possible.

The individuals who register for WIN are counseled by the local welfare agency about typical job tasks and aided in making an occupational choice. At this point they may be referred to an unsubsidized job, a work experience program or a formal skill training program. The following data present information on participants in on-the-job training. Most of those in formal training programs are included in the data from the Maricopa County Skill Center.

Table 8
WIN On-the-Job Training Participants
Arizona - Fiscal Year 1978

Occupational Category	Entered OJT
Professional, Technical and Managerial	6
Clerical	105
Sales	12
Domestic	0
Other Service	29
Processing	15
Machine Trades	9
Bench Work	136
Structural Work	7
Motor Freight, Transportation	3
Packaging, Materials Handling	15
Other	3

OTHER SOURCES OF OCCUPATIONAL SUPPLY

Unemployment Insurance (UI)

The rolls of the insured unemployed have long been a primary source of information on the labor supply. However, unlike data on graduates of training or education programs, UI data which includes "initial" as well as "continued" claimants may include some individuals who are not well qualified for the occupations in which they claim to be seeking work. The largest part (about 9 out of 10) are those who are eligible to draw benefits and, therefore, have recent experience in the occupation.

Quarterly data provide a comparison of the fluctuation of numbers of applicants during 1978. During the year, applicants have declined as the unemployment rate has eased downward.

Table 10
Unemployment Insurance Claimants by Occupation
Arizona 1978

D.O.T. Code	Occupational Category	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
00	Architecture, Engineering & Surveying	135	89	93	82
01		124	88	73	56
02	Mathematics & Physical Sciences	82	59	30	25
04	Life Sciences	86	47	74	78
05	Social Sciences	16	10	8	19
07	Medicine & Health	183	158	155	176
09	Education	155	83	188	124
10	Museum & Library	6	8	10	10
11	Law	15	19	18	8
13	Writing	22	24	22	23
14	Art	54	55	59	36
15	Entertainment & Recreation	52	47	71	37
16	Administrative Specialties	513	406	425	406
18	Managers & Officials	541	474	451	395
19	Misc. Professional & Technical	125	116	118	-
20	Stenography, Typing & Filing	632	569	668	662
21	Computing & Account Recording	932	923	929	743
22	Production & Stock Clerks	290	192	184	128
23	Information & Message Dist.	218	207	211	199
24	Miscellaneous Clerical	98	92	110	87
25	Sales, Services	53	39	33	37
26	Sales, Consumable Commodities	73	63	57	49
27	Sales, Commodities	397	266	286	294
29	Miscellaneous Sales	382	229	214	178
30	Domestic Service	51	25	40	31
31	Food & Beverage Preparation	585	524	715	446
32	Lodging Services	95	91	143	59
33	Barbering, Cosmetology	4	36	58	28
34	Amusement & Recreation Service	9	5	1	4
35	Miscellaneous Personal Service	153	117	113	108
36	Apparel & Furnishing Service	71	54	45	22
37	Protective Service	175	107	79	94
38	Building & Related Service	220	106	113	107
40	Plant Farming	196	131	104	94
41	Animal Farming	26	14	15	17
42	Miscellaneous Agricultural	132	33	19	12
44	Fishery	171	-	-	7
45	Forestry	1	15	6	71
46	Hunting & Trapping	12	-	-	-
50	Processing of Metal	23	16	7	11
51	Refining & Foundry	134	126	19	80
52	Processing of Food	145	41	183	61
53	Processing of Paper	-	1	1	-
54	Processing of Petroleum, Coal, Etc.	6	2	5	3
55	Processing of Chemicals	39	18	16	14
56	Processing of Wood	3	1	1	-

Table 10 (Continued)
Unemployment Insurance Claimants by Occupation
Arizona 1978

D.O.T. Code	Occupational Category	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
57	Processing of Stone, Clay, etc.	22	20	15	5
58	Processing of Leather, Textiles	40	7	8	9
59	Processing, n.e.c.	46	19	11	14
60	Metal Machining	135	94	66	72
61	Metalworking	92	48	48	38
62	Mechanics	454	265	188	129
63	Machinery Repairers	208	135	114	114
64	Paperworking	15	5	6	6
65	Printing	26	28	25	21
66	Wood Machining	37	30	13	21
67	Machine, Stone, Clay, etc.	2	2	1	4
68	Textile	-	2	2	-
69	Machine Trades, n.e.c.	51	18	20	10
70	Assembly of Metal Products	1	89	104	72
71	Assembly of Scientific Products	57	32	22	23
72	Assembly of Electrical Equipment	381	248	252	181
73	Assembly of Assorted Products	55	25	20	15
74	Painting & Decorating	48	9	17	4
75	Fabrication of Plastics	20	7	7	9
76	Fabrication of Wood Products	20	9	16	12
77	Fabrication of Sand, Clay, etc.	14	12	6	6
78	Fabrication of Textile, Leather	197	99	137	103
79	Benchwork n.e.c.	-	2	2	2
80	Metal Fabricating	219	115	83	124
81	Welders & Cutters	262	96	69	70
82	Electrical Assembling, Installing & Repairing	384	202	158	181
84	Painting, Plastering & Cementing	232	113	96	118
85	Excavating, Grading & Paving	589	230	141	170
86	Construction, n.e.c	1,510	755	759	989
89	Structural Work, n.e.c.	212	119	83	121
90	Motor Freight	1,002	436	410	396
91	Transportation	186	97	93	86
92	Packaging, Material Handling	487	422	784	568
93	Extraction of Minerals	468	100	90	206
95	Utilities Production & Dist.	39	26	12	19
96	Amusement & Recreation	4	5	11	5
97	Graphic Art	63	46	46	29
	State Totals	17,411	11,699	11,361	10,597

IV.
Relating
Supply & Demand

This chapter presents a comparison of available supply-demand data. Many occupations are listed with a brief description of necessary qualifications and other training and licensing requirements. Data on entry rates, turnover, advancement, etc. should be carefully noted since information of this type may radically change conclusions drawn from the statistics.

The estimated 1977 Arizona employment is listed as well as projected average annual job openings due to growth and replacement over the 1977 to 1985 period. Also included are the most recent data on the total number of persons completing training from:

Colleges and Universities
Junior and Community colleges
Job Corps
Vocational Education program
Apprenticeships
CETA programs
Employer training program.

A breakdown of the total training statistics for occupations which require less than 2 years of college is found in Appendix B. All training data are to be found in Chapter III. Statistics on occupational employment and projected demand are presented in Chapter II. A brief supply-demand analysis is given when additional information was available.

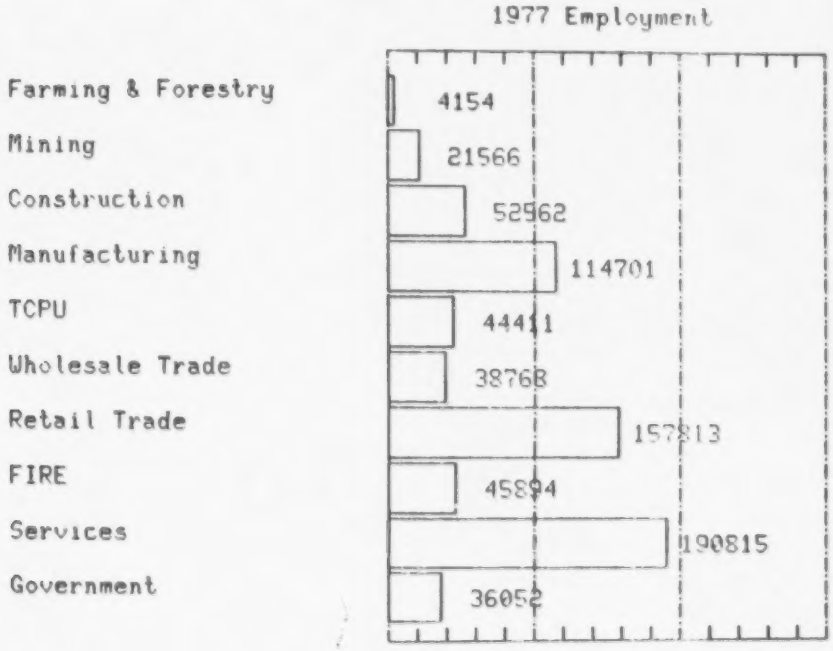
ARIZONA OCCUPATIONAL OUTLOOK

As Arizona unemployment declined from the 1975 high of 12.1 percent to an average of 6.1 percent in 1978, the demand for qualified workers has substantially increased. New businesses and industries have moved into the state at a pace exceeding the population growth. These new firms draw more people into the area who in turn create a need for more workers to build their homes and schools, provide services and sell goods. Interwoven with this supply and demand picture are factors such as technological advances. In the past 50 years technology has both created and eliminated hundreds of jobs. New machines and techniques will continue to change the fabric of the working world in years to come.

Many national employment trends have been evident in Arizona. These can be seen in industrial as well as occupational patterns of growth. To get a better idea of Arizona jobs, a summary of the primary industries will be presented first.

Arizona Wage and Salary Employment

by Industry



ARIZONA'S INDUSTRIES

The economy can be roughly divided into ten industry categories under two broad groups - service producing and goods producing. About 73 percent of Arizona's workers are employed in industries that provide services such as education, health care, trade, government, transportation, public utilities, banking and insurance. The production of goods through farming, mining, construction and manufacturing requires about one-fourth of the Arizona work force. Nationally goods-producing industries make up about one-third of the work force.

Arizona has had a history of concentration within these service-producing industries. While the Nation has experienced a shift from goods production to services, it has only been in recent years that the Arizona manufacturing sector has gained substantial employment.

SERVICE-PRODUCING INDUSTRIES

The greatest number of job openings in Arizona will be found in service industries, the fastest growing group in the service producing category. Hotels and motels are the largest Arizona employers among the services. Most of the workers in these establishments are concerned with cleaning and maintenance or clerking and billing occupations. The growth of hotels and motels will be dependent upon the number of tourists attracted to the state in coming years.

The growing need for health care has been a primary force behind the increasing employment opportunities in medical service establishments. Arizona's large retirement communities, an increase in health insurance, a growing public concern over preventive health care and the advancing technology in new equipment should continue to spur growth in this sector. Other sectors of the growing service industry include business services such as computer equipment rental or temporary clerical help; restaurants; personal services such as garment cleaning, photography and beauty shops; auto repair; amusement and recreation facilities; legal services; and educational services which includes schools even though school personnel are technically government employees.

Professional and technical workers are the predominant occupation groups within the various service industries. However, the need for clerical and service workers is expected to increase more rapidly through 1985.

Retail trade is the second largest sector of Arizona industry employment. Although tourism to the state adds a healthy boost to this industry, rising personal incomes, increased population and the expansion of suburban areas have also contributed to its steady growth. As self-service stores become more prevalent, minor declines in some sales clerking jobs may be felt. Sales clerks, sales representatives or agents, stock clerks and waiters and waitresses are the largest occupational groups within retail trade. Each of these jobs also provide career advancement opportunities leading to more responsible positions in store management.

Finance, Insurance and Real Estate (FIRE) will grow faster than the service industry as a whole. Employment in this sector is expected to increase over 40 percent from 1974 to 1985. Banking and credit industries have been mainly responsible for this growth, reflecting the increased use of checking accounts, credit cards, and easy loans. Clerical workers make up most of the employed in these firms while sales personnel managers and officials make up most of the remainder.

Transporataion, Communication and Public Utilities (TCPU) industries is a relatively small and slow growing segment of the service-producing industry. However, various business within this group have experienced widely varying rates of growth. The energy crisis may soon cast a new light on the scene as Arizonans like other Americans, scramble to develop alternate, more cost effective transportation systems and methods of power generation. A variety of occupations are represented in this industry. Crafts workers, clerical and operatives are the major occupational categories. The best employment opportunities should be for professional and technical workers, especially those in the engineering sciences.

Government is the smallest of the service producing industries in Arizona, excluding school and military personnel. National trends towards reduced government spending and/or employment has had some impact although legislation calling for programs such as national health insurance or a comprehensive energy plan, could substantially increase employment. Growth has been greatest in agencies providing education, health, sanitation, welfare, and police and fire protection. Clerical workers comprise about one-third of total government employees; service and professional, technical workers each account for about one-fourth of the employment. Nearly every occupational category - except sales can be found in various government agencies.

GOODS-PRODUCING INDUSTRIES

Manufacturing the largest of the four goods producing industries. While this sector of the economy has maintained fairly stable employment levels nationwide, the rapid growth of Arizona manufacturing has been reflective of the benefits of technology. The production of complex electronic machinery and components accounts for a substantial portion of manufacturing employment. Approximately 75 percent of Arizona firms produce durable goods which in addition to electronics, include primary metals such as copper refining, fabricated metal such as tools, stone, clay and glass products, aircraft and missiles, and lumber and wood products. The smaller nondurable goods sector manufactures clothing, food and printed materials.

Although assemblers and machine operators are the largest occupational groups in the manufacturing industry, the highly technological nature of much of Arizona's production demands an increasing number of professional and technical workers. Crafts workers and clericals represent about one-third of manufacturing jobs. All new job opportunities will greatly depend upon the number of new firms moving to Arizona, which has been substantial during the past year, and general economic conditions.

The Construction industry provided employment for over 52,000 persons in 1972. Employment has grown rapidly primarily in response to the rising population, creating a demand for commercial as well as residential building. Although the rapid rates of growth are expected to slow, employment losses will probably not occur, not withstanding a national recession. Special trades contractors who engage in specialized aspects of construction - and who can easily transfer to maintenance and repair activities - will grow at a faster rate than general contractors which are more sensitive to overall economic conditions.

Crafts workers comprise over fifty percent of construction industry employment. Laborers, managers, operatives, and clerical workers make up the rest of the occupational structure.

The Arizona mining industry has experienced dramatic fluctuations in employment in recent years. Although employment levels are expected to rise through 1985, further changes in government policy concerning the stockpiling of copper or other changes on the world market could again cause this industry setbacks. Copper mining represents the bulk of Arizona mining; gold, silver and molybdenum production are largely byproducts of copper mining. Coal mining has been recently undertaken in the northern areas of the state and may be dramatically increased should critical oil shortages arise. Machine operatives and crafts workers represent the majority of construction employment. Increasingly sophisticated mining equipment frequently allows an increase in production and a decline in employment.

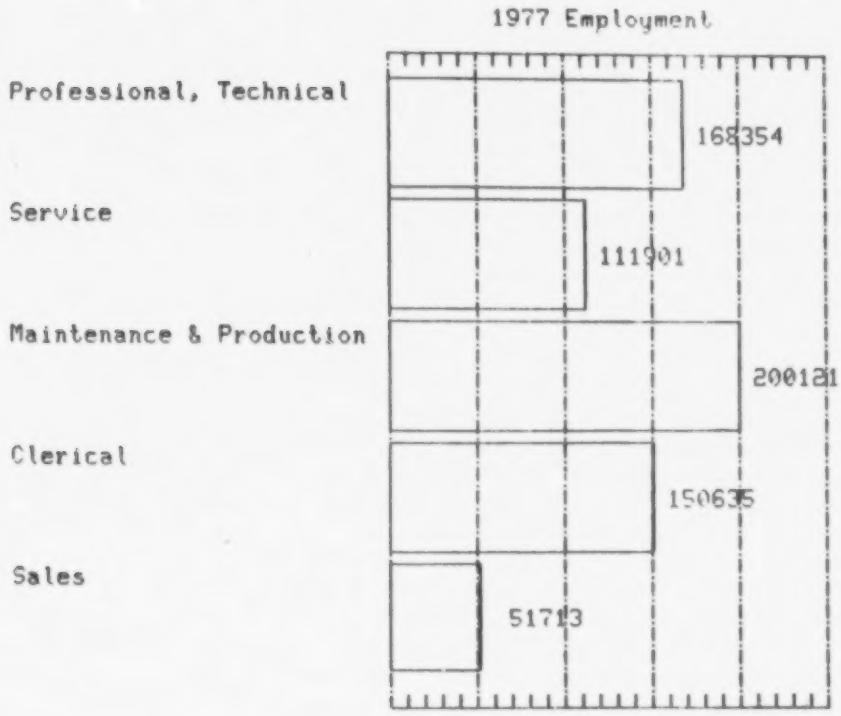
Despite the abundant evidence of Arizona's agriculture, the farming industry has been steadily declining although employment is expected to remain fairly stable through 1985. New farming machinery and scientific research have allowed the production of more crops with fewer workers. Technology has, however, increased the need for professional and technical workers. While Arizona's climate allows farmers to plant a variety of crops during various seasons, the climate also accounts for the widely fluctuating employment levels during the year.

OCCUPATIONAL PROFILE

Occupations are generally divided into several groups. White-collar workers are those in professional, technical, managerial, clerical and sales jobs. Blue-collar workers are those in crafts, operative and laborer jobs. Service workers and farm workers constitute separate groups. Chart 3 illustrates the occupational profile in 1977.

Growth rates among these groups have differed markedly. Once a small proportion of the work force, white-collar workers have steadily increased in importance until they now represent over half of the total. The number of service workers has also increased rapidly while the blue-collar work force has grown only slowly and the number of farmworkers has declined.

Arizona Occupational Employment

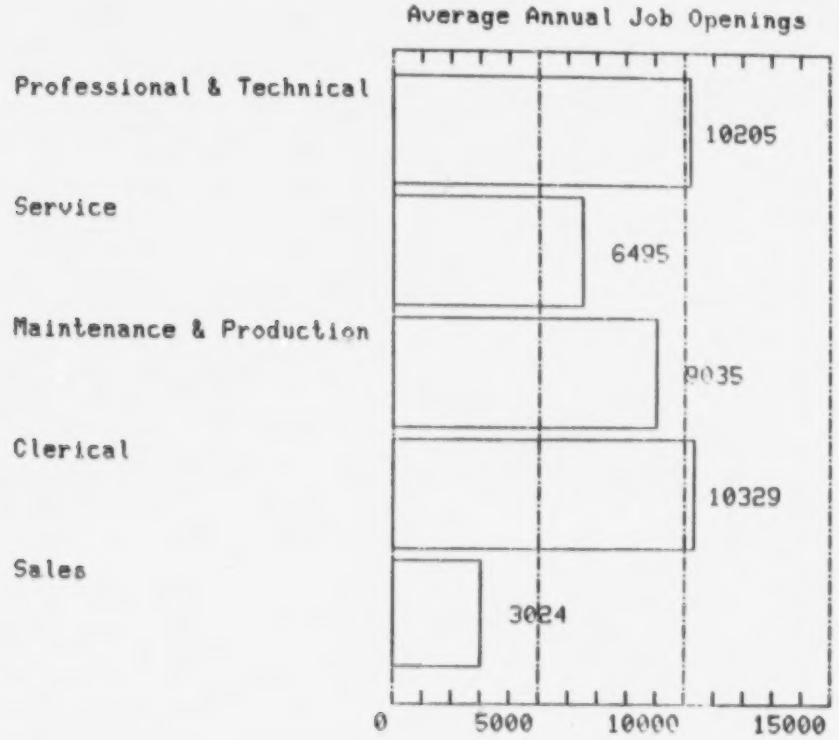


Most of the changes in occupational employment have been due to variations in the growth rates of industries. Every industrial group has unique occupational pattern. Construction, for example, employs mostly blue-collar workers, while finance, insurance, and real estate is predominantly a white-collar industry group. Growth in the construction industry would result in an increase in employment of blue collar workers. The magnitude of the change would depend on both the rate of growth and the size of the industry. However, employment change is also due to variations within occupations which may occur in one or several industries. Keypunch operators, for example, may be found in almost every industry. As new computer equipment comes into more widespread use, data conversion operators will be needed instead of keypunch operators. The demise of the keypunch operator will be felt in all industries, regardless of the growth within the particular industry.

The following sections describe some of the changes that are expected to occur among broad occupational groups between 1976 and 1985. (Estimates of growth are considered conservative annual averages even taking into account a mild recessionary period.)

Arizona Occupational Projections

1974 to 1985



Professional and technical workers include a variety of trained workers. Most of these jobs require at least some college education and an increasing number require post-graduate education. Employment in this group is expected to grow faster than the national average, but not as rapidly as some other occupational groups. Most professional job openings will occur in he services industries although engineers will be in high demand in growing manufacturing firms. Greater efforts in the fields of energy production, transportation and health care will contribute to a growing demand for scientists, engineers and medical personnel. Computer related occupations and environmental protection jobs are also projected to grow rapidly. Some occupations will offer less favorable job prospects due to an oversupply of workers. Teachers, sociologists and psychologists, and artists will face tough competition particularly in the metropolitan areas of the state.

Managers and officals include workers such as corporate excutives, school and health service administrators, department store managers and self-employed business operators. The trade industry is the largest employer of these workers although they are found in every industry. Changes in business size and organization have resulted in differing trends for self-employed and salaried managers. The number of self-employed managers will decline as many areas of business are increasingly dominated by large corporation and chain

operations. The demand for salaried managers will continue to grow rapidly as firms increasingly depend on trained management specialists, particularly in highly technical areas of operation.

Service workers make up a fast growing occupational group which includes health, protection, personal, cleaning, and food service workers. The main factors contributing to the increase in service workers are Arizona's rapidly growing population, tourism and rise in personal income. These in turn, contribute to increased demand for medical care, commercial cleaning and protective services and the more frequent use of beauty salons, restaurants and recreational facilities. The employment of private household workers is the only category expected to decline. Employment of all service workers in Arizona, however, is expected to increase much faster than the national average.

The broad maintenance and production category includes a variety of blue collar workers. Operatives are a major group including drivers and equipment operators as well as various industrial machine operators. Their employment is closely tied to the production of goods, since the majority of these workers are employd in manufacturing industries. The projected slower growth of some types of manufacturing, along with energy shortages and improved production processes may hold down the demand for some of these workers. Textile industry operatives are expected to decline although those involved in machine tool production and others in electronics industries are expected to increase. Outside of manufacturing, transportation operatives such as bus and truck drivers will experience increased employment opportunities as the transportation industry grows.

Craft workers include a wide variety of highly skilled workers such as mechanics and repairers, construction workers, and metal workers. Between 1976 and 1985 employment in this group is expected to increase about 37 percent, although the phenomenal construction industry has already experienced growth of over 25 percent in a single year! Construction workers and skilled metal craft workers will have the most favorable opportunities. Carpenters, electricians, plumbers and machinists are currently in the highest demand. Among mechanics and repairers, the most rapid increases will be for those who repair computers, air conditioning, office machines, and industrial machinery. Because of advances in printing technologies, very little growth is anticipated in printing crafts.

Assemblers are expected to be in increased demand as manufacturing firms, particularly electronics-related manufacturers, move to Arizona. The employment of various other maintenance and production workers will be highly dependent upon the growth of the industry and changes in production methods.

Laborers (except farm) include workers such as garbage collectors, construction helpers, gardeners, freight and stock handlers, and auto service station attendants. Employment in this group is expected to grow slowly as machinery increasingly replaces the need for manual labor. Construction and manufacturing firms are the largest employers of these workers.

Clerical workers constitute one of the largest and the fastest growing occupational groups in the Nation as well as in Arizona. While national

employment is expected to increase about 30 percent from 1976 to 1985, Arizona jobs should grow by over 40 percent in the clerical field. Although it was widely predicted that computers would lead to the demise of many office jobs, almost the reverse has been true. Although computerization and the introduction of other office machines has eliminated many menial and repetitive duties and provided increased opportunities for computer and other equipment operators and those jobs requiring personal contact. Substantial growth is anticipated for secretaries, typists and receptionists. Since most clerical positions have high rates of replacement and turnover, job openings are generally plentiful. Counter and fountain workers are also expected to increase in coming years as the restaurant industry grows.

Sales workers are primarily employed by retail stores, insurance agencies and real estate companies. These jobs should increase by over one-third from 1974 to 1985. Most of this expansion will be due to the growth of retail stores, as evidenced by the construction of ever larger suburban shopping malls. Despite the widespread use of laborsaving merchandising techniques, such as self-service and computerized check-out counters, the increasing population as well as tourists will cause employment to expand.

This brief overview of industrial and occupational trends presents the growth anticipated on the Arizona job scene. However, a job seeker's ability to actually get a job greatly depends on the supply of workers competing for that job. Thus the intent of this publication is to provide at least a starting point for analyzing the labor market. Graduates of training institutions represent only one aspect of the labor supply, but even this can frequently point up potential areas of imbalance.

PROFESSIONAL AND TECHNICAL OCCUPATIONS

Engineers

A bachelor's degree in engineering generally is required for most entry positions. College graduates trained in one of the physical sciences or mathematics may also qualify for some jobs. Experienced technicians with some engineering education may advance to engineering jobs. Graduate training is emphasized for an increasing number of jobs; it is essential for college and university teaching and for some research positions, and is desirable for advancement in many areas.

Arizona requres licensing for some engineers through the State Board of Technical Registration. New graduates with engineering majors are the primary source of engineers. Limited data on past patterns of entry into the occupation indicate large numbers also have entered from other sources: workers who shift occupations (including those who are upgraded); persons not in the labor force (including those in the Armed Forces); immigrants; and college graduates with majors in fields other than engineering. However, patterns of entry from these other sources are affected, to some extent, by the availability of engineering graduates.

Currently engineering is considered the highest demand occupation in Arizona, the nation, and indeed, worldwide. Dramatic fluctuations in the supply-demand scenario in recent years triggered by cut-backs in defense spending and the oil embargo in the mid 70's, led to a reduced number of young people entering this field. Arizona univeristies report that most engineering students have obtained or have been offered employment before they actually graduate. Since almost half of the graduates leave the state, Arizona is experiencing a shortage of engineers, particularly electrical and electronic.

	1977 Employment	Average Annual Job Openings	Degrees in Engineering Bachelor's	Master's	Ph.D.
All Eng.	10,504	532	768	202	21
Civil	1,181	86	122	16	1
Electrical	4,219	218	98	46	7
Industrial	641	351	6	17	-
Mechanical	1,176	54	81	15	1

Life Scientists

A bachelor's degree is adequate preparation for some jobs. However, a Ph.D. is usually required for college teaching and for senior research positions. A professional health degree is necessary for some jobs in medical research.

New graduates with a major in one of the life sciences are the primary source of supply. A significant number of workers have entered these occupations from other sources: immigration; reentrants to the labor force; graduates

with other majors; and workers who transfer from other occupations. Less than one-third of those who received degrees in the life sciences in the past actually entered the field. Many become teachers or laboratory technicians or go to medical, dental, or veterinary schools. Those available to fill life science occupations are generally considered to be in oversupply.

	1977 Employment	Average Annual Job Openings	Degrees in Life Sciences Bachelor's	Master's	Ph.D.
All Life Sci.	299	11	396	80	52
Biologist	208	7	220	22	8

Mathematics Occupations

For the majority of positions, at least a master's degree in math is generally required; a Ph.D. is required for teaching in colleges and univeristies. Almost all doctorate holders and about a third of master's degree holders entered the field in the past. Others have become high school teachers or another applied field and a minor in statistics is preferable.

A bachelors degree in statistics or math is generally required to become a statistician. For some jobs, however, a bachelor's degree in economics or another applied field and a minor in statistics is preferable.

	1977 Employment	Average Annual Job Openings	Degrees in Mathematics Bachelor's	Master's	Ph.D.
All Mathematics	383	22	78	25	3
Statisticians	162	13	1	2	-

Physical Scientists

Chemists. A bachelor's degree in chemistry is usually the minimum requirement for entry positions in analysis and testing, quality control, technical service and sales, or jobs as assistants to senior chemists in research and development labs. Graduate training is essential for many positions, and is helpful for advancement.

Follow-up data on college graduates indicate that in the past fewer than half of those who receied degrees actually entered the field. Many went on to medical, dental or veterinary schools or became teachers.

Geologists. A bachelor's degree in geology or a related field is adequate training for many entry jobs. An advanced degree is helpful for promotion in most types of work and is necessary for college teaching and some research position.

Although the physical sciences make up a small occupational field in Arizona, it is expected to grow more rapidly throughout the 1980's as the search for natural resources and their best utilization continues.

	1977 Employment	Average Annual Job Openings	Degrees in Physical Sciences Bachelor's	Master's	Ph.D.
All Physical Scientists	1,220	54	235	111	56
Chemists	477	21	100	16	19
Geologists	482	22	44	21	1

Engineering and Science Technicians

As the demand for professional engineers and scientists has risen, so has the demand for their assistants, generally called technical workers. An associate of arts (2 year) degree or technical school is usually required although some workers may receive on-the-job training.

Biological Science Technicians. These workers assist biological scientists and other life scientists. Technical school or college education is an advantage for those wanting to advance to supervisory positions or to more specialized jobs.

Drafters. Post-high school drafting training in technical institutes, junior and community colleges or, extension divisions of universities, generally provides adequate training for beginning drafters. Necessary skills also may be obtained on the job, combined with part-time schooling or through 3-or 4-year apprenticeship progams.

Electrical, Electronic Technicians. Persons can qualify for these jobs through many combinations of education and work experience. Post-high school technical training consists of one to four years of full-time study at a technical training institute, junior or community college, or other technical training facility. Qualifications can also be obtained through the Armed Forces.

Surveyors. A combination of post-secondary school courses in surveying and extensive on-the-job training is the most common method of entry. Junior colleges, technical institutes, and vocational schools offer 1, 2, and 3-year programs in surveying. Arizona requires licensing of surveyors through the State Board of Technical Registration.

	1977 Employment	Average Annual Job Openings	A. A. Degrees	Other Training*
All Engineeering & Science Technicians	12,917	769	432	565
Bio. Sci. Tech.	980	72	14	-
Drafter	2,676	167	49	173
Elec. Tech.	4,279	241	314	413
Surveyor	733	44	-	-

*See Appendix B for breakdown of training information.

Medical Occupations

Dentists. There is no school of dentistry within Arizona, so all of the new labor supply must come from other states. Over 500 dentists practice in Arizona.

Physicians. The University of Arizona trains medical doctors within the state. Physicians must be licensed with the Arizona Board of Medical Examiners. The demand for physicians is expected to continue increasing in coming years as Arizona's climate has attracted many retirees and others with health problems. Foreign physicians and those from other states add to the Arizona labor supply, which has not met the demand, particularly in rural areas. U.S. Public Health Service projections indicate that over the 1974-85 period the number of M.D. and D.O. degrees granted nationally will average somewhat below the number needed to meet projected requirements.

Nurses. Nursing programs vary in length from 2 to 5 years. A master's degree is preferred for research, consultation, teaching, and clinical specialization. The U. S. Public Health Service projects that the number of graduates from nursing programs will approximate the number of openings in coming years. A clear assessment of the adequacy of training in this field is difficult, however.

Traditionally, not all graduates have entered nursing immediately upon graduation, or have left the labor force early in their careers. Thus a substantial pool of qualified nurses exists outside the labor force. Many of these nurses are expected to enter or reenter the field, but the number depends on many factors, which are difficult to analyze. Nurses are considered to be in critical shortage in Arizona and efforts are underway to recruit nurses from other states.

Veterinarians. There is not a school of veterinary medicine in Arizona, so the entire labor supply must be trained in or transferred from other states. The number of graduates nationally is expected to average the number of job openings available.

Note: Since OES did not survey hospitals, the following employment and opening numbers have been inflated to more accurately reflect employment.

	1977 Employment	Average Annual Job Openings	Degrees in Medicine A.A.	Bach.	Master	Grauduate
All Medical Workers	13,820	1,252	469	515	50	-
Physician	3,801	397	-	-		95
Nurse (Registered or Professional)	8,849	738	469	278	47	-
Physical Therapist	1,170	117	-	18	-	-

Health Technicians and Technologists

Dental Hygienists. These workers must be licensed with the Arizona State Dental Board and only graduates of accredited dental hygiene schools are eligible for licensing. Most accredited programs last 2 years and lead to a certificate or an associate degree. Generally these programs are sufficient

to qualify for work in a private dental office. A bachelor's degree is usually requied for research, teaching and work in public or school health programs.

Medical Laboratory Technician. A medical lab technician needs at least 4 years of college including completion of a specialized training program in school training in a junior college or vocational school, although some are trained in the Armed Forces. Most assistants are trained on the job although some training may qualify them for promotions.

Radiologic (X-ray) Technologists. A formal training program in X-ray technology is generally required to enter the field. These programs, which usually last 24 months, are offered in some hospitals, medical schools, community colleges, vocational schools and the military.

	1977 Employment	Average Annual Job Openings	Degrees in Health Technology A.A.	Bachelor's
All Health Tech.	1,650	169	163	236
Dental Hygienist	447	71	22	21
Med. Lab. Tech.	416	26	9	49
X-ray Tech.	292	16	65	-

Technicians, exc. Health

Air Traffic Controllers. Trainees are selected through the competitive Federal Civil Service System. Aplicants must have 3 years of progressively responsible work experience that demonstrates their potential and/or a college degree. Successful applicants receive both on-the-job and formal training. It usually takes 2 to 3 years to become a fully qualified controller. The Armed Forces also provide training.

Airplane Pilots. All commercial and private pilots must be licensed by the Federal Aviation Administration. Flying can be learned in military or civilian flying schools. Applicants hired by a scheduled airline usually start as flight engineers or co-pilots. Deregulation of the airlines as well as fewer people entering the military training programs may soon lead to a shortage of trained pilots.

Funeral Directors and Embalmers. These workers must be licensed by the Arizona State Board of Funeral Directors and Embalmers. Most embalmers attend an approved mortuary science school, serve a two-year apprenticeship and pass a state board examination. They must work as embalmers for one year before qualifying as a funeral director.

Broadcast Technicians. Technicians must obtain a Radio-Telephone First Class Operator license from the Federal Communications Commission. To obtain the license, applicants must pass a series of written tests covering subjects such as the construction and operation of transmission and receiving equipment. Courses in math, science and electronics are good preparation. Technical school or college is an advantage.

	1977 Employment	Average Annual Job Openings
All Technicians	3,909	297
Airplane Pilot	410	14
Air Traffice Cont.	229	10
Embalmer	86	5
Broadcast Tech.	165	10
(7 Associate Arts degree conferred)		

Computer Specialists.

Programmers. There are no universal training requirements for programmers because employer's needs vary. Some require college graduates; other do not. Firms that use computers for scientific or engineering applications usually require programmers to have a bachelor's degree with a major in the physical sciences, mathematics, engineering, or computer science. Some of these jobs require a graduate degree. In firms that use computers for business applications, experience in inventory control, payroll, or accounting often is more important than a college degree. Nonetheless, these firms usually prefer applicants who have had courses in data processing or programming.

Systems Analyst. There is also no single way of preparing for a job as a systems analyst because employer's preferences depend on the type of work done in the firm. Generally, however, a bachelor's degree is the minimum educational requirement. For a job with a bank, insurance company, or business firm, a college degree in accounting, business, or economics is appropriate. For work in a scientific or technical organization, applicants need a degree in the physical sciences, mathematics, engineering, or computer science. In addition to the bachelor's degree in a suitable field, some employers prefer applicants with some experience in computer programming. Because of the importance of this experience, many who begin as prgrammers are promoted to analyst trainees.

	1977 Employment	Average Annual Job Openings	Degrees in Computer Sciences A.A.	Bach.	Masters
All Computer Spec.	2,670	157	74	80	26
Programmer	1,457	86	31	-	-
Systems Analyst	1,231	71	-	7	-

Social Scientists

Psychologists. A Ph.D., considered the full professional degrees, is needed for many entrance positions and is becoming increasingly important for advancement. Psychologists who want to enter private practice must be licensed by the State Board of Psychologist Examiners. Many graduates of psychology programs enter other fields due to a large oversupply of applicants.

Sociologists. A master's degree in sociology is generally the minimum requirement for employment as a sociologist. A Ph.D. is necessary for teaching at most colleges and universities. It is also commonly needed for jobs as directors of major research projects, administrators, and consultants. Most graduates must seek employment in other occupations since the number of degrees granted far outnumber the job openings.

Political Scientists. Graduate training is generally required for employment as a political scientist. A Ph.D. normally is necesary for teaching and is helpful for advancement in nonacademic areas. Those with a master's degree often qualify for various administrative and research jobs in government and in nonprofit research or civic organizations. Many graduates who do not enter the field take related jobs in administration, teaching, or journalism.

Historians. A master's degree is the minimum requirement for college instructors. Most historians in the Federal government and in nonprofit organizations have Ph.D. degrees. Most graduates have to seek employment in other fields due to the limited number of job openings.

Urban or Regional Planners. A master's degree in planning is the usual requirement for jobs at the entry level. For some jobs, however, a bachelor's degree in city planning, architecture, landscape architecture, engineering, or other closely related field is acceptable.

	1977 Employment	Average Annual Job Openings	Degrees In Social Sciences Bach.	Master	Ph.D.
All Social Scientists	1,656	107	1,331	244	61
Psychologist	649	39	332	33	30
Sociologist	11	1	186	27	5
Urban & Reg. Planner	263	20	-	11	-
Political Scientist	-	-	243	47	4
Historian	-	-	169	21	5

Teachers

All public school teachers must be certified by the Arizona State Board of Education. A bachelor's degree which includes student-teaching and education courses is generally the minimum requirement for certification. Additional courses or a master's degree may be required within a certain period after employment. Local school systems may also have additional requirements.

New degree recipients are the primary sources of the teacher supply although reentrants, delayed entrants and in-migrants to the State account for a substantial number of applicants. Most job openings are expected to occur from the need to replace teachers who leave the field rather than from growth.

Despite the problems of estimating future supply and demand, there is every indication that new graduates will substantially exceed the average annual job openings. The exception is in rural areas of the State, particularly Indian reservations, which experience difficulties recruiting teachers.

	1977 Employment	Average Annual Job Openings	Degrees In Education Bach.	Master	Ph.D.
All teachers	33,804	1,524	1,767	1,576	149
Elementary & Pre-Sch.	18,545	779	677	344	6
Secondary	7,771	73	353	207	9
Adult Ed.	2,145	126	-	8	3
Counselors	824	72	-	21	8
Voc-Ed.	409	39	20	23	4
Special Ed.	-	-	268	252	7

Writers, Artists, Entertainers

Reporters and Technical Writers. Most large newpapers will consider only applicants with a college education; graduate work is becoming increasingly important. Some jobs for talented writers without college training are available on rural or small town newspapers.

A bachelor's degree is generally required to begin work as a technical writer. They may qualify with a degree in engineering or science, and courses on writing. Sometimes, experienced writers with less academic training but some knowledge of technical fields can qualify.

Commercial Artists. Artistic ability and good taste are the most important qualifications for success in commercial art. However, these qualities must be developed by specialized training in the techniques of commercial art; limited training may also be obtained through vocational high schools and on-the-job experience but supplemental training usually is need for advancement.

Radio & Television Announcers. A college liberal arts education provides an excellent background for an announcer, and many universities offer courses of study in the broadcasting or mass communications field. Some private vocational schools may also offer training. Radio stations require announcers to have a Federal Communications Commission radio-telephone operator license.

Advertisement and Display Workers. Most display workers learn their trade on the job in 2 or 3 years. Increasingly, employers prefer applicants who have studied advertisement, interior decorating, fashion design and art.

Photographers. There are several ways to prepare for work as a professional photographer. People interested in commercial photography often start as trainees in a commercial studio, and undergo 2 or 3 years of on-the-job training. For work in industrial, scientific, or news photography, formal training and experience usually are needed. Photographic training is available in colleges, universities, and art schools.

	1977 Employment	Average Annual Job Openings	Degrees In Fine Arts Bach.	Master	Ph.s.
All Communications	1,586	104	341	24	-
Journalism	1,174	93	92	15	-
Radio, TV (Announcer)	412	11	115	-	-
Advertising	-	-	23	-	-
All Fine Arts	2,790	152	425	133	6
Commercial Art	536	32	150	62	-
Music	569	28	97	51	6
Photography	362	19	23	-	-
Actor, Actress	120	-1	61	16	-
Vocational Education, Senior Classes -					
Commercial Art	77				
Photography	74				

Architects and Designers

Architects. Architects must obtain a license to practice in every State and the District of Columbia. To qualify for a license, applicants must have a bachelor's degree in architecture, have 3 years of experience in an architect's office, and pass a 2-day written examination. Those with a master's degree need 2 years of experience. Qualifications for landscape architects are the same as other architects in Arizona.

Designers. Persons usually enter the industrial design field by completing a curriculum in an art school, university, or technical college. Those with degrees in other fields such as engineering, architecture, and fine arts may qualify as industrial designers if they have appropriate experience and artistic talent.

Formal training in interior design is becoming increasingly important for entry. Training is available through a 2- or 3-year course at a recognized art school or a college or university program leading to a degree in interior design and decoration. In most cases, 1 to 5 years of on-the-job training also are required.

	1977 Employment	Average Annual Job Openings	Degrees In Architecture Bach.	Master's
All Architects & Related	1,150	59	219	16
Architects	339	21	118	4
Designers	811	38	83	-
Interior Desingers	-	-	73	-
Env't. Designers	-	-	10	-
Landscape Architect	55	3	18	1

Other Professional & Technical Occupations

Accountants. Most large firms require a bachelor's degree with a major in accounting, or in a closely related field such as business administration or economics. Some prefer applicants with a master's degree in accounting. In addition to programs at the college level, training is available in junior and community colleges, business schools, and correspondence schools.

Certified Public or Public Accountants must be licensed by the Arizona State Board of Accountancy. A bachelor's degree, 2 years of experience and an examination are required. Job opportunities for licensed accountants are in demand in all types of industries.

	1977 Employment	Average Annual Job Openings	Degrees Conferred A.A.	Bach	Master's
Accountants	5,072	286	21	474	43

Foresters. A bachelor's degree with a major in forestry in generally required to become a forester. Teaching and research require advanced degrees. The National Center for Education Statistics project an average of 2,500 bachelor's degrees in forestry annually nationwide as compared to less than 1,000 job openings. Therefore, many forestry graduates may have to seek employment in other fields.

Foresters are mainly employed by Federal and State government agencies, and lumbering companies.

	1977 Employment	Average Annual Job Openings	Degrees Conferred A.A.	Bach	Master's
Forester	330	18	7	41	4

Lawyers. Admission to the bar is a prerequisite for the practice of law in all states. To qualify for the bar examination Arizona requires a law degree from an accredited law school (a 4 year college degree plus 3 years of law school).

Not all law school graduates, however, pass the bar examination and seek to practice law. Some enter politics, public administration, business or other fields.

	1977 Employment	Average Annual Job Openings	Juris. Doc. Degrees
Lawyer	1,987	147	240
Judge	225	24	-

	1977 Employment	Average Annual Job Openings	Other Legal Degrees Bach.	Master
Law Clerk	256	18	-	-
Paralegal Personnel	196	14	-	-
Criminal Justice	-	-	131	21

Librarians. For professional librarians in public, academic, and special libraries, completion of a 1-year master's degree program in library science is usually required. For school librarians, a bachelor's degree in education with specialization in librarianship or audiovisual technology is the basic requirement, although a master's degree may be preferred.

	1977 Employment	Average Annual Job Openings	Master's Degree Library Science
Librarian	993	56	95

Other Professional Workers

	1977 Employment	Average Annual Job Openings	Degrees Conferred Bach.	Master's
Marketing	-	-	290	7
Buyer, Purchasing Agent	4,349	384	-	-
Insurance (Sales)	1,939	78	28	-
Real Estate (Sales)	751	69	50	-
Restaurant Mgmt.	2,602	122	13	-

OFFICE OCCUPATIONS

Clerical Workers

Bookkeepers. High school graduates who have taken business arithmetic, bookkeeping, and accounting generally meet the minimum requirements for most bookkeeping jobs. Some employers prefer applicants who have completed business courses at a junior college or business school. Work/study programs offer an opportunity to learn skills through on-the-job experience.

General Office Clerks. Employers prefer high school graduates for beginning clerk jobs. Many seek applicants who can type and have some knowledge of office practices. Newly hired workers usually begin with several weeks of on-the-job training to learn the employer's filing system and procedures.

Cashiers. Employers prefer high school graduates for cashier jobs. Courses in business arithmetic, bookkeeping, and other business subjects are good preparation. Most cashiers are trained on the job. In large firms, training may include classroom instruction in the use of cash registers and other equipment.

Receptionists. High school graduation generally is the minimum requirement for work as a receptionist. Business courses such as typing are helpful. Some employers prefer applicants with some college or business school training. This is frequently an entry-level position with promotional opportunities.

Secretaries and Stenographers. High school graduation is the minimum educational requirement for practically all secretarial positions. Many employers prefer applicants who have had additional college or business school training which may range from a few months to a two year program. Applicants generally must meet minimum standards for typing and stenographic speed. High turnover rates in this occupation account for a large number of additional job openings.

Teller. Tellers usually learn their skills on the job although banks prefer applicants with some experience in office work. Some experience or training is important because tellers must have the tact and maturity to deal with customers. Because tellers handle large amounts of money, applicants must meet bonding standards.

Typists. Typists generally need to be high school graduates, and must be able to type at least 40 to 50 words per minute. Good spelling, punctuation, and grammar are important skills. Most typists learn their skills in high school, vocational or business schools or junior colleges.

	1977 Employment	Average Annual Job Openings	Available Training Data*
Accounting Clerk	5,124	275	-
Bookkeeper	7,065	379	338
Cashier	12,786	682	77
General Office Clerk	20,991	1,446	1,959
Receptionist	3,651	315	-
Secretary	17,944	1,449	1,333
Teller	4,064	265	70
Typist	8,645	647	1,293

Computer Operators

Computer Operator. Many employers prefer computer operators, such as console operator, to have some college education or formal training. Computer training is offered in high schools, junior colleges, and vocational and business schools. Employers frequently must train new workers since new computer equipment is being rapidly developed.

Keypunch Operator, Peripheral Equipment Operator. High school education is generally required for keypunch and computer peripheral equipment operators. Most employers prefer some skill training available from high schools, junior colleges or business schools.

	1977 Employment	Average Annual Job Openings	Available Training Data*
Computer Operator	1,356	79	8
Keypunch Operator	2,310	42	17
Data Processing			370
Peripheral Equip. Operator	274	16	19

*See Appendix B for breakdown of training information.

SERVICE OCCUPATIONS

Health Service Occupations

Dental Assistants. Many dental assistants learn their skills on the job. An increasing number, however, are trained in formal post-high school programs. Most of these prorams, available in vocational and technical schools, last 1 year, and lead to a certificate or diploma. Two-year programs offered in junior and community colleges lead to an associate degree.

Dental Laboratory Technicians. Most dental technicians acquire their skills on the job. This training usually lasts 4 or 5 years. Some are trained in 2 year education programs accredited by the American Dental Association. Dental technicians may become certified by passing an examination given by the National Board for Certification, a trust established by the National Association of Dental Laboratories.

Inhalation Therapy Workers. Although a few therapists, also called respiratory therapy workers, receive on-the-job trainig, most entry level positions require formal training. High school graduation is required for entry to most institutions offering this specialized training. Courses last from 18 months to 4 years and include both theory and clinical work.

Licensed Practical Nurses. All states regulate the licensing of practical nurses. To be licensed in Arizona applicants must have two years of high school or the equivalent (less if over 25 years of age) and graduate from an approved school of practical nursing. The required course generally lasts one year and is given in junior colleges, local hospitals, health agencies, and public or private schools.

Medical Records Technicians and Clerks. Most employers prefer to hire medical records technicians who have graduated from an accredited college or hospital-based program. These programs range from 10 months for a certifcate to 2 years for associate degree. High school graduates with basic secretarial skills can enter the medical records field as clerks. About one month of on-the-job training will prepare them for routine tasks.

Nursing Aides, Orderlies, and Attendants. Although some employers prefer high school graduates, many hire nongraduates. Training is usually acquired on the job, often in combination with some classroom training.

Optical Technicians. Employers prefer high school graduates who have had courses in basic sciences. Most trainees learn their skills on the job. Some learn through a 3 to 4 year apprenticeship although a 2 year community college program is more common in Arizona. These workers are sometimes called Dispensing Opticians. Licensing is required by the State Board of Dispensing Opticians.

Surgical Technicians. Most surgical or operating room technicians are trained in vocational and technical schools, hospitals, and community and junior colleges. These training programs last form 9 months to 1 year, some junior college programs last 2 years and lead to an associate arts degree.

	1977 Employment	Average Annual Job Openings	Available Training Data
Dental Assistants	1,227	97	69
Dental lab tech.	516	41	7
Inhalation Therapy			84
Licensed practical nurse	782	96	153
Medical records tech	46	7	63
Nursing aide, orderly	3,231	322	274
Optical tech.	404	35	16
Surgical tech.	-	-	10

Note: Since OES did not survey hospitals, the employment and annual openings may be much greater than indicated here.

Food Service Occupations

Cooks and Chefs. Most cooks acquire their skills on the job while employed as kitchen helpers, although it is becoming common for cooks to have a high school or post high school training in food preparation. Less frequently, they are trained as apprentices under trade union contracts or employee training programs conducted by large hotels and restaurants.

Bakers. Many workers begin as bakers' helpers. Apprenticeship programs last 3 or 4 years and include on-the-job training and classroom instruction in related subjects. Some workers take courses in vocational school or learn baking in the Armed Forces. High school training may not qualify a person as a skilled baker but may help in getting a job as a helper or shorten the apprenticeship period.

Meatcutters. These workers acquire their skills either informally on the job or through apprenticeship programs. Those in apprenticeships generally complete 2 to 3 years of supervised on-the-job training supplemented by some classroom work. Employers prefer high school graduates.

	1977 Employment	Average Annual Job Openings	Available Training Data
Baker	613	29	42
Cook, chef	15,529	815	109
Meatcutter	2,072	75	110

Note: Bakers and meatcutters may be classified with service occupations when they work in restaurants or retail stores or they may be classified as production workers when they are employed by food processing companies.

Other Service Occupations

Cosmetologists. All states require that cosmetologists be licensed. Arizona requires the completion of an 1,800 hour course from an approved beauty school. Vocational high school classes provide good preparation. Licenses are granted by the Arizona State Board of Cosmetology.

Custodial Workers. Most custodial workers are trained on the job although some training may be helpful in gaining employment. A high school diploma is not required as a rule, but workers should know simple arithmetic and read well enough to follow written instructions. They may also be referred to as janitors or cleaners.

	1977 Employment	Average Annual Job Openings	Available Training Data
Cosmetologists	3,665	266	437
Custodial Workers	11,583	847	12

MAINTENANCE & PRODUCTION OCCUPATIONS

Metalworking Occupations

All-round Machinists. A 4-year apprenticeship program is the best way to learn the trade. However, some companies have training programs for single-purpose machinists that require less than four years, and some machinists learn on the job. A typical 4-year apprenticeship includes 8,000 hours of shop training and 570 hours of classroom training. Aircraft quality machinists are in high demand in the Phoenix and Tucson areas.

Machine Tool Setter. Set up workers usually must qualify as all-round machinists. They must be able to operate one or more kinds of machine tools and select the sequence of operations so that metal parts will be made according to specifications.

Tool and Die Makers. Skill can be acquired through a 4- or 5-year apprenticeship on the job. Several years of experience after apprenticeship often are required for the more difficult tool and die work.

Boilermakers. Most boilermakers acquire their skills on the job, but a 4-year apprenticeship is probably the best way to learn this trade. Layout and fitup workers generally learn their trades on the job as helpers for 2 or more years.

Electroplaters. Most electrgplaters learn the trade on the job. A small percentage train through an apprenticeship program. High school courses in chemistry, physics, electricity, math and blueprint reading are helpful.

Millwrights. These workers generally acquire their skills on the job or through 4-year apprenticeship programs that combine shop training with classroom instruction.

Welders. Generally, it takes several years of on-the-job training to become a skilled welder. Some less skilled jobs can be learned in a few months. Before being assigned to work where the strength of the weld is a highly critical factor, welders may be required to pass a qualifying examination given by an employer or a government agency.

	1977 Employment	Average Annual Job Openings	Available Training Data*
Machinists	2,704	154	116
Machine Tool Setter, Operator	1,005	56	7
Tool and Die Maker	530	37	11
Boilermaker	365	18	5
Electroplater	466	27	15
Millwright	155	13	7
Welder	2,901	163	591

Construction Occupations

Asbestos & Insulation Workers. Asbestos workers learn their trade through either informal on-the-job training or a 4-year apprenticeship program.

Bricklayers & Stonemasons. Completion of a 3-year apprenticeship program is the recommended training for these trades. Training may also be obtained informally on the job.

Carpenters. A 4-year apprenticeship program, including 144 hours of classroom instruction, is recommended. Training may also be acquired on the job. Some knowledge of the trade may be obtained through vocational courses in carpentry and shop.

Cement Masons. Cement masons learn their trade either through on-the job training as helpers or through 2 or 3 year apprenticeships.

Electricians. A high school education is usually required for electrician jobs. An apprenticeship program lasting 4 years and including 144 hours of classroom instruction each year is recommended. Most cities require electricians to pass licensing examinations. Many individuals who completed electrician training in the past went into industries other than construction. They frequently work in large buildings as maintenance electricians or for public utilities.

Drywall Installers and Finishers. These workers usually start as helpers and learn most of their skills on the job. Some employers, in cooperation with unions, offer classroom instruction to supplement on-the-job training. Apprenticeships are available.

Floor Covering Installers. Most workers acquire their skills on the job. Others qualify through apprenticeship programs. Courses in general mathematics and shop may provide a helpful background for floor covering work.

Glaziers. These workers learn their trade through a 4-year apprenticeship or through on-the-job training. Some individuals who completed glazier training in recent years have entered other industries. During the early 1970's, apprenticeship completions numbered nearly 50 percent of openings nationwide.

Lathers. Although many lathers learn on the job, an apprenticeship lasting from 2 to 4 years is recommended. Apprenticeship completions numbered more than 35 percent of national job openings in the early 1970's.

Painters, Paperhangers. Although a 3-year formal apprenticeship program including related classroom instruction is recommended, training may also be obtained on the job. During the early 1970's, apprenticeship completions numbered less than 10 percent of openings nationally.

Plasterers. A 3 to 4 year apprenticeship, including classroom instruction, is recommended, but many learn on the job by working as helpers or laborers.

Plumbers, Pipefitters. A 5-year apprenticeship including related classroom instruction is recommended but many learn the trade on the job. Some skills

may be acquired in vocational school courses. Some localities require workers to pass a licensing examination.

Roofers. A 3-year apprenticeship including classroom instruction is recommended. The majority of roofers, however, acquire their skills by working as helpers.

Sheet-Metal Workers. A 4-year apprenticeship including classroom instruction is recommended, but many workers learn on the job. During the early 1970's, the number of apprenticeship completions were greater than job openings for sheet-metal workers in the construction industry; many went into other industries.

Structural, Ornamental & Reinforcing Ironworkers. A 3-year apprenticeship program including related classroom instruction is recommended. During the 1960's and early 1970's, apprenticeship completions numbered about 30 percent of national openings.

	1977 Employment	Average Annual Job Openings	Available Training Data
Asbestos & Insulation Wkr.	194	13	7
Bricklayer, Stonemason	1,308	76	25
Carpenter	5,947	357	316
Cement Mason	1,276	78	17
Drywall Installer	539	32	7
Electrician	4,110	98	249
Floor Covering Installer	480	23	6
Glazier	426	26	-
Ironworker	205	14	43
Lather	155	9	-
Painter	1,698	122	23
Plasterer	267	7	26
Plumber	2,628	196	67
Roofer	852	65	21
Sheet-Metal Worker	1,701	114	102

Mechanics & Repairers

Air-Conditioning, Heating & Refrigeration Mechanics. Most mechanics start as helpers and learn their skills on the job. Employers prefer high school graduates who have studied math, physics, electronics and blueprint reading. Many high schools and vocational schools offer courses to prepare students for entry jobs.

Aircraft Mechanics. Most mechanics learn their job in the armed forces or in private trade schools certified by the Federal Aviation Administration. Others learn through apprenticeship or on-the-job training programs. Some large airlines train new workers in 3 or 4 year programs including classroom instruction. Mechanics who work on civilian aircraft usually must be licensed by the FAA.

Appliance Repairers. These workers usually start as helpers and are trained on the job. High school courses in electricity, electronics, shop math and blueprint reading provide a good background.

Auto Body Repairers. Generally, 3 to 4 years of on-the-job training are necessary to become fully qualified. Apprenticeship training is recommended.

Auto Mechanics. Most auto mechanics learn the trade through 3 to 4 years of on-the-job experience. Additional time may be needed to learn a difficult specialty such as automatic transmission repair. An apprenticeship program is the best way to learn the trade.

Diesel Mechanics. Generally, mechanics need 3 to 4 years of on-the-job training or formal apprenticeship to become fully qualified. Trade and technical school courses in diesel engine maintenance and experience in repairing gasoline engines are helpful.

Heavy-Duty Mechanic. Most workers who become industrial machinery repairers begin as helpers and acquire their skills through several years experience. Others learn their trade through 4-year formal apprenticeship programs.

	1977 Employment	Average Annual Job Openings	Available Training Data
Aircraft Mechanic	1,708	58	45
Air-Conditioning, Mechanic	845	45	66
Appliance (T.V., Radio) Repairer	1,092	42	12
Auto Body Repairer	977	26	302
Auto Mechanic	8,350	362	370
Diesel Mechanic	555	27	69
Heavy-Duty Mechanic	-	-	12
Maintenance Mechanic	2,941	138	1,290
Mining Mechanic	511	25	9
Small Engine, Tool Repairer	227	8	4

Printing & Graphic Arts Occupations

Bookbinders and Related Workers. A 4 or 5 year apprenticeship that combines on-the-job training with related classroom instruction generally is the recommended training for skilled bookbinders. The less skilled bindery workers learn the trade through informal on-the-job training that may last from several months to 2 years.

Photoengravers, Stereotypers. These workers usually learn their trades through 5 to 6 year apprenticeships. Photoengravers have at least 800 hours of classroom instruction. High school courses such as printing, chemistry and physics are helpful.

Lithographic Occupations. Many lithographic craft workers learn their trades through 4 or 5 year apprenticeships. These programs may emphasize a specific

craft such as platemaker or press operator, although an attempt is made to make the apprentice familiar with all lithographic operations. Two year programs in printing technology are offered by technical schools and colleges.

Printing Press Operators and Assistants. The recommended way of learning this trade is through an apprenticeship. The apprenticeship period in commercial printing shops is 2 years for press assistants and 4 to 5 years for operators.

	1977 Employment	Average Annual Job Openings	Available Training Data
Total Printing Workers	2,534	93	100
Bookbinder	555	22	-
Lithography	-	-	91
Press Operators	923	32	7

Other Maintenance & Production Occupations

Furniture Upholsterers. The most common way to learn this trade is to complete on-the-job training in an upholstery shop. Other ways of acquiring training are by working for furniture manufacturers in jobs closely related to upholstering, or through vocational or high school courses. A few people go through a 3 to 4 year apprenticeship.

Auto Body Painter. Most automobile painters start as helpers and acquire their skills informally by working for 3 to 4 years with experienced painters. A small number learn through a 3 year apprenticeship.

Stationary Engineers. Many stationary engineers start as helpers or craftsworkers in other trades and acquire their skills informally on the job. A 4-year apprenticeship is recommended as the best way to learn the trade. High school or trade school graduates with courses in math, mechanical drawing, machine shop practices and chemistry are preferred. Some cities require stationary engineers to be licensed.

Heavy Equipment Operators; Crane, Derrick and Hoist Operators. Most workers can be trained on the job to operate equipment although an apprenticeship is recommended.

	1977 Employment	Average Annual Job Openings	Available Training Data
Auto Body Painter	364	15	34
Furniture Upholsterer	247	11	6
Crane, Derrick & Hoist Op.	681	42	105
Heavy Equipment Op.	-	-	13
Stationary Engineer	604	20	3

V.
Appendix

APPENDIX A. METHODS AND ASSUMPTIONS FOR PROJECTIONS OF MANPOWER REQUIREMENTS

The Bureau of Labor Statistics developed a comprehensive model of the economy in 1985. The model is comprised of internally consistent projections of gross national product (GNP) and its components -- consumer expenditures, investment, government expenditures, and net exports; industrial output and productivity; labor force; average weekly hours of work; and employment for detailed industry groups and occupations. The methods and assumptions used to develop the average annual openings to 1985 in Arizona are based on the same methods used for national projections in other BLS studies of the economy. These are briefly summarized in the following sections.

Projections methods

Beginning with population projections by age, sex, and race developed by the Bureau of the Census, the total labor force is projected, using expected labor force participation rates. In developing the participation rates, the Bureau takes into account a variety of factors that affect a person's decision to enter the labor market, such as school attendance, retirement practices, and family responsibilities.

The labor force projection is then translated into the level of GNP that would be produced by a fully employed labor force. Unemployed persons are subtracted from the labor force estimate and the result is multiplied by a projection of output per worker. The estimates of future output per worker are based on analysis of trends in productivity growth among industries and

changes in the average weekly hours of work. Next, the projection of GNP is divided among its major components: consumer expenditures -- Federal, State, and local -- and net exports. Each of these components is broken down by producing industry. Thus, consumer expenditures, for example, are divided among industries producing goods and services such as housing, food, automobiles, medical care, and education.

Once developed for these products and services, estimates are translated into detailed projections of industry output, not only for the industries producing the final product, but also for the intermediate and basic industries which provide the raw materials, electric power, transportation, and other inputs required in the production process. To facilitate this translation, the Department of Commerce has developed input-output tables which indicate the amount of output of each industry -- steel, glass, plastics, etc. -- that is required to produce a final product, automobiles for example.

Using estimates of future output per hour based on studies of productivity and technological trends for each industry, industry employment projections may be derived from the output estimates.

These projections then are compared with employment projections from regression analysis. This analysis develops equations that relate employment by industry to combinations of economic variables, such as population and income, that are considered determinants of long-run changes in employment. By comparing projections from input-output and regression analysis, it is possible to identify areas where one method produces a projection inconsistent with past trends or the Bureau's economic model, and the projections are adjusted accordingly.

Projections of industry employment then are translated into occupational employment projections from an industry-occupation matrix. This matrix, which is divided into 201 industry sectors and 4,421 occupation sectors, describes the current and expected occupational structure of each industry. By applying the projected patterns of occupational structure for each industry to the industry employment projection and aggregating the resulting estimates, employment for each of the 421 occupations contained in the matrix can be projected.

In some cases employment is related directly to one of the components of the bureau's model -- for example, the number of cosmetologists is related to consumer expenditures for beauty shop services. In others, employment is related to an independent variable not explicitly projected in the model, but believed to be a primary determinant of employment in that occupation. The projection of automobile mechanics, for example, is based on the expected stock of motor vehicles. Projections that are developed independently are compared with those in the matrix and revised, if necessary, to assure consistency.

In addition to a projection of employment for each occupation, the number of replacements is estimated. Separations constitute a significant source of openings. In most occupations, more workers are needed to replace those who retire or die than to fill jobs created by growth. Consequently, even declining occupations offer employment opportunities.

To estimate replacement openings, the Bureau has developed tables of working life based on actuarial experience for deaths and on decennial census data on general patterns of labor force participation by age and sex. Withdrawals from each occupation are calculated separately for men and women by age group and used to compute a separation rate for the occupation. These rates are used to estimate average annual replacement needs for each occupation over the period.

The effects of interoccupational transfers are not considered when calculating replacement needs because little information is available on this type of separation. After the rates of occupational growth and replacement are calculated for the Nation, BLS further refines these rates for each State. State analysts have made additional modifications to growth and replacement rates based on their knowledge of local labor markets.

Supply estimates used to analyze the prospective job outlook for certain occupations represent the numbers of workers who would seek jobs in particular occupations if past trends of entry to the occupation continue. These estimates are developed independently of the demand estimates and, therefore, demand relationships are not discussed in the usual economic sense in which wages play a major role in equating supply and demand.

Assumptions

The Bureau's projections to 1985 are based on the following general assumptions:

*The institutional framework of the U.S. economy will not change radically.

*Current social, technological, and scientific trends will continue, including values placed on work, education, income, and leisure.

*The economy will gradually recover from the high unemployment levels of the mid-1970's and reach full employment (defined as 4 percent unemployment) in the mid-1980's.

*No major event such as widespread or long-lasting energy shortages or war will significantly alter the industrial structure of the economy or alter the rate of economic growth.

*Trends in the occupational structure of industries will not be altered radically by changes in relative wages, technological changes, or other factors.

Editor's Note: These assumptions were made by the Bureau of Labor Statistics when making the original estimates for growth in 1975. Obviously some of these assumptions may be changing, such as energy shortages. Since it is unknown exactly what effect , or to what extent these events will change employment levels, it is not feasible to take them into account as yet. This factor should be kept in mind and regarded as one limitation of the projection data.

APPENDIX B

	Voc-Ed Senior Classes	Apprenticeship Completions	Job Corps Graduates	Employer Training Completions	CETA Completion	Com. & Jr. College Graduates	Other College Programs
OFFICE OCCUPATIONS							
Accounting (Bookkeeping)	264		2		47	21	4
Cashier					77		
General Office Clerk (Filing)	1809		45		105		
Secretary Stenographer	860		53		257	114	49
Teller					52	11	7
Typist	1287		6				
Computer Operator	8					16	
Data Processing	327					43	
Peripheral Equip. Operator							19
Keypuch Op.			1				16
HEALTH SERVICE OCCUPATIONS							
Dental Assistant						14	55
Dental Lab Tech.						7	
Inhalation Therapy Tech.						46	38
Lic. Practical Nurse	39		1			1	112
Medical Records Tehc.					1	18	44
Nursing Aide, Orderly	49		17		208		
Optical Tech.						16	
Surgical Tech.						2	8
FOOD SERVICE OCCUPATIONS							
Baker	41		1				
Cook, Chef	56				53		
Meat Cutter			1		109		
OTHER SERVICE OCCUPATIONS							
Cosmetology	437						
Custodial Service			12				
METAL WORKING OCCUPATIONS							
Boiler Maker		5					
Electroplater				15			
Machine Tool Setter				7			
Machinist		8		60	48		
Millwright		6		1			
Tool and Die Maker				11			
Welder	313	8	2	123	118	18	9
CONSTRUCTION OCCUPATIONS							
Asbestos & Insulation Worker		7					
Bricklayer, Stonemason		6	19				
Carpenter	163	120	33				
Cement Mason		6	11				
Electrician	39	141		34	35		
Drywall Installer & Finisher		7					
Floor Covering Installer		6					
Painter		6	17				
Plasterer		4	12				
Plumber, Pipefitter		60					
Roofer		21					
Sheet Metal Worker	15	37		50			
Iron Worker		43					

	Voc-Ed Senior Classes	Apprenticeship Completions	Job Corps Graduates	Employer Training Completions	CETA Completion	Com. & Jr. College Graduates	Other College Programs
MECHANICS & REPAIRERS							
Aircraft Machanic	45						
Air-conditioning Installer, Mech.	31		1		34		
Appliance (TV, radio) Repairer	21						
Auto Body Repairer	242				60		
Auto Mechanic	106	11	6		85	86	76
Diesel Mechanics	40					14	15
Mechanic, Maintenance	1269	8		13			
Heavy Duty Mechanics		12					
Mine Mechanic		9					
Small Engine Mechanic	4						
PRINTING & GRAPHIC ARTS							
Commercial Artist	77					35	52
Commercial Photographer	74						
Lithography	79	2				10	
Web Press Operator		7					
TECHNICAL OCCUPATIONS							
Aerospace Tech						64	
Architectural Drafter						25	3
Civil Engineering						7	
Construction Tehc.						13	7
Drafter, Engineering	119					24	2
Electronics Assembler	130		97		99		
Electronics Tech.						314	413
Electromechanical Tech.						51	36
Forestry						7	
Industrial Tech.						5	11
MISC.							
Auto Body Painter					34		
Crane, Derrick, Hoist Operator				6			
Furniture Upholsterer	105						
Heavy Equip. Operator		13					
Stationary Engineer		3					

ENROLLMENT AT INSTITUTIONS OF HIGHER LEARNING IN ARIZONA

	1974	1975	1976	1977	1978
Colleges & Universities					
Arizona State University	35,145	37,395	35,135	36,443	37,122
University of Arizona	31,844	30,375	30,181	30,398	29,086
Northern Arizona University	10,165	10,956	11,423	12,768	
DeVry Institute of Technology	2,359	2,424	2,400	2,200	
Grand Canyon College	1,014	1,201	1,137	1,201	
Community Colleges					
Pima Community College	15,266	19,588	20,003	21,351	21,521
Phoenix College	11,914	13,990	13,617	14,036	13,622
Glendale Community College	9,441	12,094	11,819	12,290	12,035
Mesa Community College	9,750	11,702	11,679	11,907	
Scottsdale Community College	4,622	5,729	6,061	6,356	
Central Arizona College	4,427	5,961	5,620	6,090	5,306
Maricopa Technical College	7,633	6,109	5,151	5,196	3,377
Yavapai College	3,909	4,675	4,242	4,309	4,536
Cochise College	2,829	3,407	3,863	3,977	4,022
Arizona Western College	3,908	4,013	3,864	3,779	4,060
Eastern Arizona College	2,690	3,948	3,109	3,363	
Mohave Community College	1,521	2,635	2,710	3,305	3,410
Northland Pioneer College	2,010	2,993	2,289	3,173	
Navajo Community College	993	1,150	1,500	912	
College of Ganado	530	697	235	301	321
Other Institutes of Higher Learning					
American Graduate School of International Management	822	803	982	856	918